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Chemical Age 7 October 1950.

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The Chemical Age

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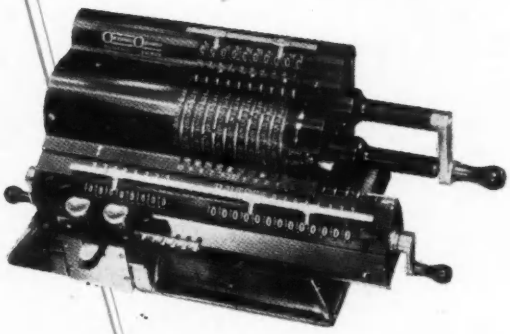

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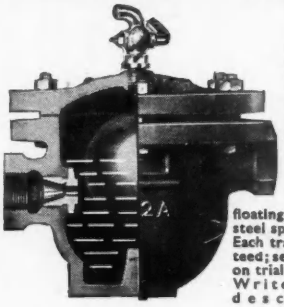

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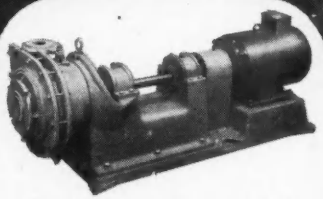

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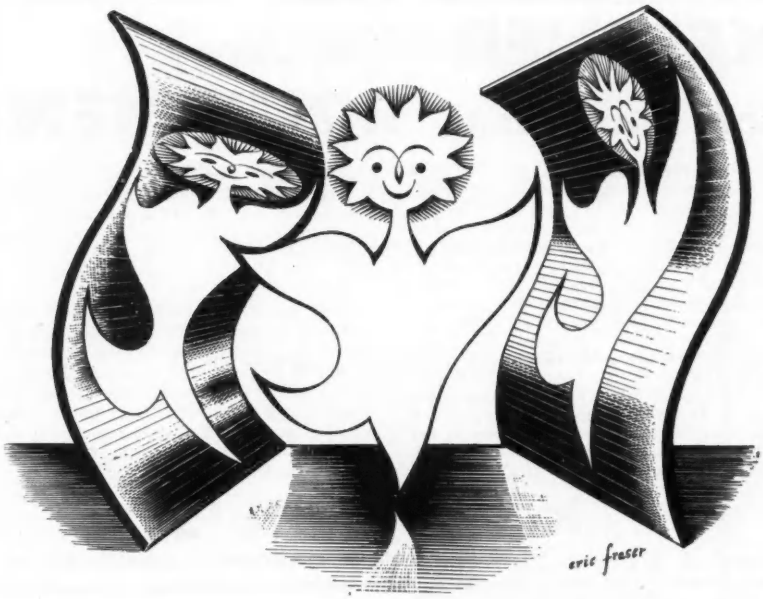

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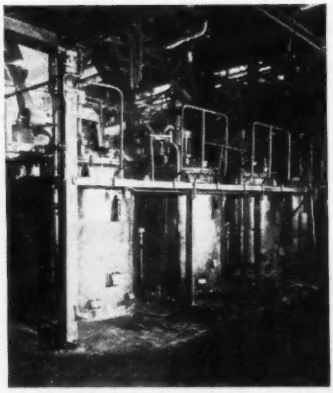

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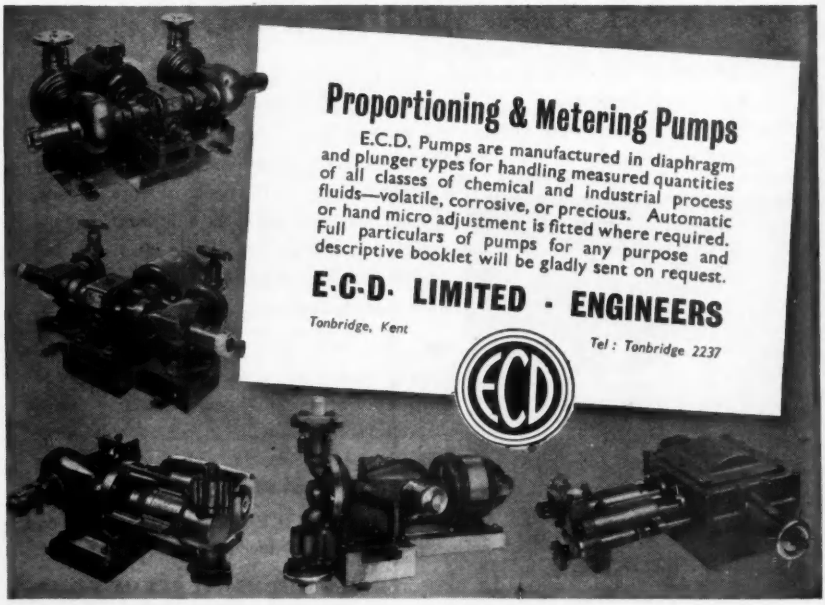
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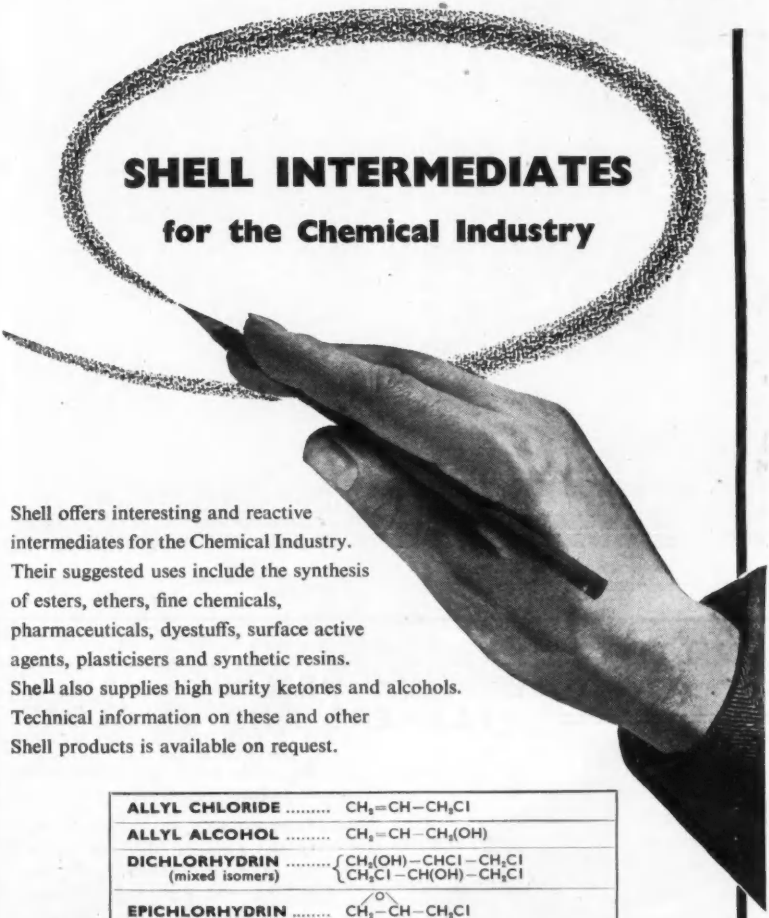

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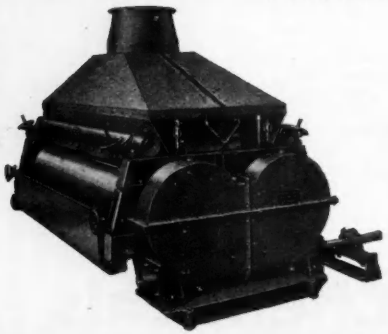

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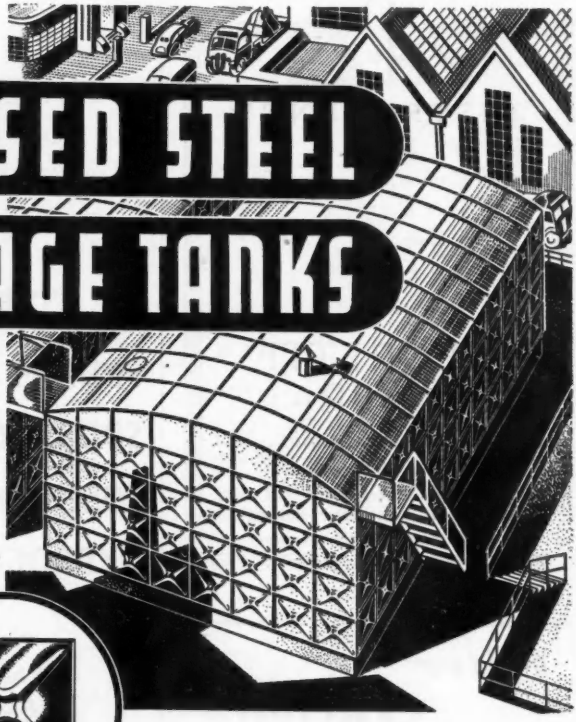

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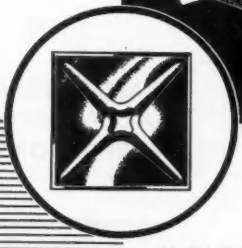

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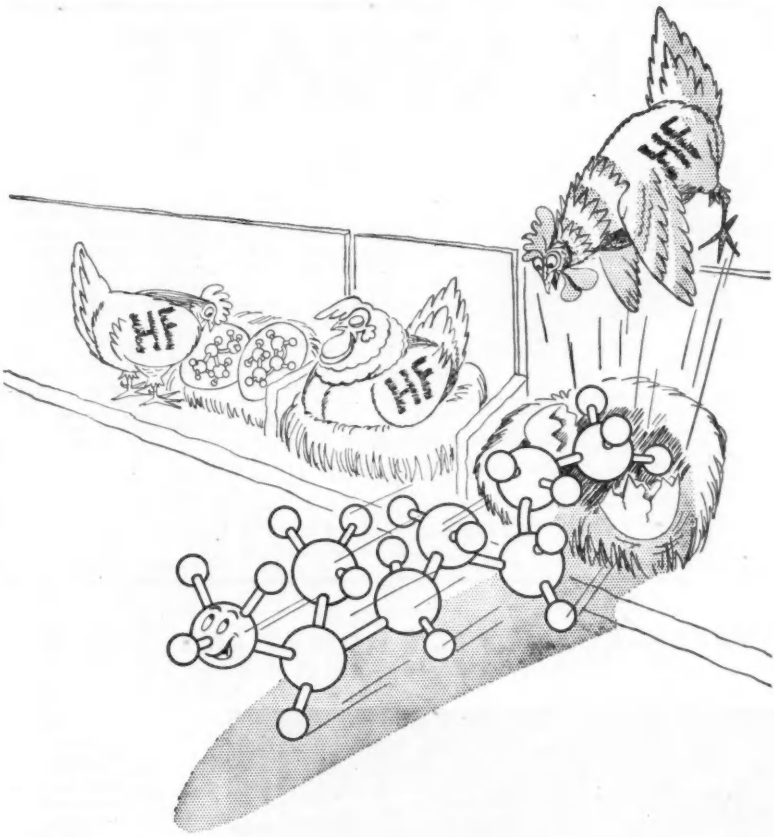

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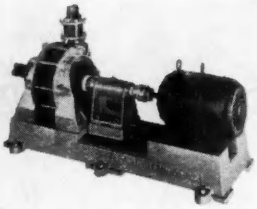

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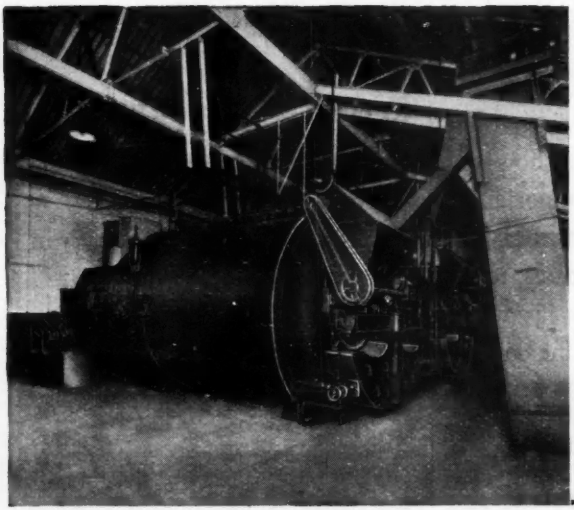

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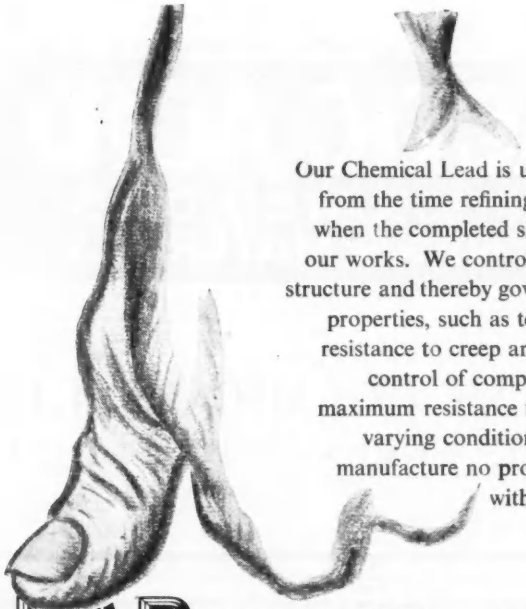

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Volume LXIII 7 October 1950 Number 1630

"Not for Publication"

OF the 50 million people in this country it is safe to say that many fewer than half a million have any conception of the size, nature or importance of the British chemical industry. There are a number of practical reasons why, even in 1950, this is so. A large proportion of the chemicals produced are never seen or handled by the general public; they are used as intermediate materials by the rest of industry. Secondly, there is still a deeply entrenched tradition of secrecy, a legacy from the past century when national competition in Europe was fierce and fearful and advances in methods or products were difficult to protect. This the "hush-hush" atmosphere is in some quarters still absurdly preserved, regardless of the fact that many of the closely-guarded "secrets" of chemical industry today are quite easily uncovered by any competent student of textbooks, journals, and patents. The ideal of full information can hardly thrive in an atmosphere of secrecy. A third reason is to be found in the fact that the chemical industry employs a very small number of people in relation to its great size and turnover; consequently, the volume of "inside information" which casually reaches the rest is minute compared with the flow that emanates from such industries as coal, transport, or building. The fourth factor is that chemical processes are not easy for the average person to understand, and a curious interest in the sensational is more easily stimulated than a balanced appreciation of what has been achieved.

All these reasons put together still do not represent a complete excuse for the industry's own lack of initiative in the field of publicity, or, to use the preferred modern phrase, of public relations. Indeed, the more difficult are facts and ideas to publicise, the greater is the need for effort. Only in recent years, however, have a few companies, which stand out as exceptions rather than typical examples, attempted to tell their own stories to the public. For generations the British chemical industry has preferred to hide its achievements within the fume cupboard. The assumption that virtue is always rewarded is unsafe in a competitive and clamorous age. Recent Parliamentary developments affecting the steel industry will suggest to some that explicit statements are wanted now of what chemical industries have done and are doing.

No one in his senses would compare the risks of State interference or nationalisation in the U.S.A. with the risks that have to be faced here.

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Throughout North America the idea of private enterprise commands support from an overwhelming majority. Yet the U.S. chemical industry is more active than any other in providing information about itself. The long-term value of publicity is understood and accepted at all levels.

" It becomes of the first importance that chemical manufacturers should get their story across to their employees, their customers, their stockholders, and the general public accurately and without delay. There is much evidence that a genuine desire for such information exists. To-day's public is showing greater interest than ever in scientific and industrial material in newspapers, magazines, and other educational media. And the chemical industry does have a tremendously worthwhile story to tell."

This is the conclusion offered in the (U.S.) *Chemical Industries* recently. It referred to the recent decision of the U.S. Manufacturing Chemists' Association to intensify its public relations work. In Britain, where the need for widespread public appreciation of what the industry is contributing to the maintenance and some advances of civilised living is more urgently required, it would be a gross exaggeration to speak of intensifying such activities. They are still almost imperceptible.

It is not suggested that the Anglo-American comparison should be pressed too far. The American man in the street is a more willing consumer of publicity. He expects to be sold an idea. The Englishman is exceedingly suspicious at the first sign of the process. To imitate American methods in detail could easily do as much harm as good. Methods used in this country require to be carefully chosen to suit the climate of public reaction. Meanwhile, in the absence of anything comparable with what is done—perhaps over-enthusiastically— in the U.S.A., in this country a " dog-with-a-bad-name " atmosphere attaches to the word " chemical ". The reaction to a current proposal to establish a fairly large chemical factory in a West Country town was an apt example. While some opposition to any industrial project was to be expected, the prefix of " chemical " produced intense local opposition. Fumes, smells, and corrosive pollution of the atmosphere were immediately foreseen by those to whom the possibility that a modern chemical works could be clean and inoffensive would probably be news. The blame, however, does not rest on them. No one has told them. If the story was a dull one, this might be understandable. But the industry has a compelling story to tell, one which touches every home in the country. It is high time it was told.

Notes and Comments

Synthetic Detergents and Soap

THE laundry and trades' exhibition at Olympia, London, which ends to-day (October 7), gained particular interest from two circumstances: it was the first since the war—in point of fact, for 12 years—and the first since the advent of commercial synthetic detergents. The latter influence, coupled with the recent freeing of soap from rationing, has invited expert estimations of the competitive position of each. A spokesman of one well-known firm which makes both soap and synthetic detergents gave his opinion, to THE CHEMICAL AGE, that even in the novel condition of ample soap supplies, synthetic detergents will at least hold the place they have won. That, he considered, could be taken as a certainty in the hard-water areas. That moderate view of soapless detergents' prospects was fairly widely corroborated, although no one is prepared to assign proportionate figures to the future distribution between soap and synthetic detergents. In American statistics a figure of 25 per cent of the whole sales of soap and soapless detergents has been assigned to the synthetics—principally the petroleum based ones. The determining factor, there, however, is the cheapness which native petroleum and a vast refining industry have promoted. An approximate parallel may one day exist here, when the new refining industries have emerged completely from their chrysalis stages. It is clear, however, that, short of some fundamental advance in the technology of the synthetics—which is not foreseen here or in America at the moment—the ascendancy of soap and soap-based detergents for particular uses will not be undermined.

Research Favours Soap

A FACTOR which is capable of having an important influence on the future usage of soap or synthetics is the policy reached by the British Launderers' Research Association, on which prejudice favouring the traditional methods is unlikely to have had any effect. The view of the research group is that for laundering as a whole and the associated detergent jobs the choice must continue to be soap. A spokesman of the research people says it has been "scientifically established" and proved in practice that at present there is no compound produced in quantity which is as complete or as good a detergent as soap. This statement might, he said, have to be modified in years to come—but not yet. The efficacy of some of the newer synthetic detergents for specific purposes, such as cleaning greasy overalls and other garments, is not denied. It is claimed, however, that this can be done quite as well by soap—preferably in nascent form. The question of soap *versus* synthetic detergents seems likely to resolve into a study of availability of materials and cost. Nascent soap, for example, seems likely always to be more expensive than the synthetic substitute. The host of exhibitors at the laundry exhibition offers an interesting commentary, if inconclusive, on the activity of the groups. There were stands of 10 makers of soap and soap products only, four of firms which make both soap and synthetic detergents, and five exhibits of concerns making only synthetic detergents.

DSIR—Co-ordinator

NONE of the many claims of benefits conferred on science and industry which could be made on behalf of the DSIR would surpass its special services as a co-ordinator of research effort in fields too diversified to have found a congenial meeting ground. That is affirmed once more in the work of one of the principal departments, the National Physical Laboratory, whose current report shows that in metallurgy, as in the other 11 divisions,

private firms as well as the specialist research associations are accepting more fully the principle of sharing work and information in common fields of research. One of the principal contributions of the DSIR metallurgists has greatly advanced the possibility of establishing accurately the mechanical properties of pure iron alloys. They have resolved the problems of production in quantity of pure iron (99.96 per cent) to the extent of producing 40 lb. weekly. That research involved some important advances by the analysts, such as a method for determining trace impurities which can probably reveal aluminium with ± 0.0005 per cent accuracy. Commercial alloy practice and the availability of some of the less common metals and derivatives, such as titanium and vanadium, will gain important advances from some of the work described in the chemistry section report. This review, unfortunately, covers only research in 1949. It certainly heightens the desire to hear the further development of those themes in the 10 months of the present year.

Two Kinds of Chemical Warfare

BECAUSE they hold prospects of far reaching benefits to some chemical producers and large sections of agriculture the antecedents of the systematic insecticides are seldom given much thought. Material benefits and the urgent need to find safeguards that will ensure that the lethal effects are confined to insect populations have further diverted attention from the early work on which the present formulations have been built and the circumstance that one important stage in that work was significantly linked with the first fearful experiments in chemical warfare—the war gases prepared by Germany in the first World War. That perversion of the original work of the German, Michaelis, during 1890-1915 was not foreseen by the author of it, who wrote of the basic knowledge of organic phosphorous compounds which he uncovered, quite disinterestedly: "Even if at this moment no special possibilities are apparent yet, there will, of that I am sure, be a future for this subject surpassing even its great past." How authentic was that prophecy has been recalled by B. A. Kilby in an able short review—in "New Biology", which Penguin Books are issuing later this month—of the development of the organic phosphorus drugs and insecticides, to which he was one of the contributors.

Plant Reactions

KILBY does not conceal the debt which is owed to German chemistry, principally in the person of Gerhard Schrader, of the I.G. laboratories at Leverkusen, in uncovering the insecticidal possibilities of organic phosphorus compounds and fluorophosphonates. One of the most decisive results was the German group's proof that plants will take up through the roots or foliage the toxic material by which the sap is rendered poisonous to predators, without damage to the plant. The energy with which the translocation principle has been exploited by chemists here and in the U.S.A.—Pestox III and Parathion are familiar examples—is continuing to produce important results. The latest, apparently belonging to that category, has made its appearance in Pittsburgh, U.S.A., under the style of E1059 (Parathion was E605), or Systox, developed from the synthetic octa-methyl pyrophosphoramide. Test results appear to show that the lethal factor has been much increased, yet it is said to be not more toxic to men than Parathion and to have longer persistence in plants than its predecessors. This branch of research is, incidentally, affording some curious and important facts about plant biology, likely to have a useful bearing on further progress in systemic poisons. The Systox studies, for example, disclosed in the course of grafting experiments that this insecticide spreads through a plant almost entirely upward and outward from the point of application. An untreated graft on treated stock becomes toxic, but a sprayed graft will not communicate its insect poison to the rest of the plant.

EXTENSION OF *p*H SCALE

New U.S. Standards

THE U.S. Bureau of Standards has announced four new *p*H standards intended to provide fixed points of reference at the upper and lower limits of the standard *p*H scale. The new standard solutions have been developed so as to extend the accuracy of the three middle-range standards at present distributed by the Bureau.

These standards of *p*H 4, 7, and 9 were originally conceived with the intention of establishing a universally accepted scale of acidity. Up to now, however, the *p*H of intermediate points has had to be obtained by interpolation and, because the scale is not uniform at its upper and lower limits, there has been need for new reference standards for highly acid and highly alkaline solutions. The four new standard substances now adopted are:

1. A mixture of sodium bicarbonate and sodium carbonate, both of 0.025 molar concentration; *p*H of about 10 at room temperature.
2. A 0.01 molar solution of tri-sodium phosphate; *p*H 11.7 (approx.).
3. A saturated solution of potassium hydrogen tartrate; *p*H 3.6 (approx.).
4. A 0.01 molar solution of potassium tetroxalate; *p*H 2.1 (approx.).

It is considered that present inaccuracies at these ranges will be considerably reduced, and in some cases eliminated, but the measured *p*H of solutions that are excessively acid or alkaline will still be uncertain to the extent of ±0.03 unit.

Croda in the U.S.A.

A FURTHER example of the policy of some British chemical companies of establishing subsidiaries in the U.S.A. was supplied last week in an announcement by Croda, Ltd., of Goole. It disclosed that next month Croda, Inc., will be formed in the U.S.A. and will set up plant for the manufacture of Hartolan wool wax alcohols, one of the specialities of the parent company.

It is hoped to embark upon the manufacture of all other Croda products as soon as possible. These will be of the kinds for which there is a large demand in the U.S.A. from the cosmetic and pharmaceutical industries, manufacturing chemists, heavy chemical manufacturers, paint manufacturers, etc.

Mr. F. A. S. Wood, a director of Croda, Ltd., and the son of the former managing director, is going to the U.S.A. at the end of October to establish the company.

NEW GPO LABORATORIES

Testing Unit at Birmingham

RECOGNITION of the GPO's increasing need for the services of analytical chemists to regulate the purchase and effective use of a host of materials was seen in the opening at Bordesley Green, Birmingham, on October 4, of a new block of analytical laboratories.

It is to serve the GPO tests and inspection department and will employ at the start some five analytical chemists and about 25 other chemistry workers in four main laboratories, mainly concerned with inorganic materials and especially metals. Later, these laboratories will collaborate in the organic chemical work for which at present the London chemistry department of the GPO is responsible.

The GPO centre, like many of its large industrial equivalents, will serve incidentally as a training ground for a substantial junior staff, all of whom are required to take the London external B.Sc. at a given stage in their service there.

The new block, covering 10,000 square feet, is very fully equipped with advanced equipment, especially for spectrographic studies of metals.

The principal guest at the inaugural function this week was Mr. F. O. Barralet, formerly chief chemist to the GPO, in which he had served for some 40 years. He began work in the London research section, served in the Dollis Hill Laboratories and was prominently associated with the plant inspection and testing department for a further 15 years.

Prospects of British Silicones

THE approaching prospect of manufacturing here silicone products, whose availability has been limited by the fact that most originate in the U.S.A., is mentioned by Albright & Wilson, Ltd. in an announcement relating to the formation of Midland Silicones, Ltd., in collaboration with the Dow Corning Corporation of America as a selling and technical service group for the U.S. products (THE CHEMICAL AGE, *63*, 478). The announcement states that, in the near future, when Albright & Wilson begin manufacture in England, the new company will act as selling agents for the English products, and the shortages imposed by restrictions on dollar imports will be entirely overcome. It is hoped that both export and home markets will benefit. The directors of Midland Silicones, Ltd. include members of both the English and American companies.

AUGUST IMPORT LEVELS

Chemicals Rise to £3.1m

ALTHOUGH there were declines in a number of individual items, imports of chemicals, drugs, dyes and colours in August totalled £3,133,527, more than double the value of the same month last year, and £461,520 more than in 1948.

Decreases occurred in chemical machinery, the potassium compounds and sulphur. Among the more notable increases were: sodium compounds £102,914 (£60,511); and carbon blacks £359,108 (£104,516).

	August, 1950	August, 1949
	Cwt.	Cwt.
Acetic anhydride	9,298	4,805
Acetic acid	—	—
Boric acid	400	6,400
Carbolic acid	2,511	—
Value of all other sorts of acid	£63,239	£66,773
	Cwt.	Cwt.
Borax	18,000	24,001
Calcium carbide	—	—
Cobalt oxides	402	625
	Tons	Tons
Fertilisers	—	205
	Lb.	Lb.
Glycol ethers and glycol ether-esters	503,176	96,609
Iodine	136,736	—
	Cwt.	Cwt.
Potassium chloride	709,574	674,788
Potassium sulphate	10,220	32,560
All other potassium compounds	6,373	5,235
Value of all potassium compounds	£518,368	£557,395
	Cwt.	Cwt.
Sodium nitrate	—	39,880
All other sodium compounds	19,083	11,155
Value of all sodium compounds	£102,914	£60,511
Chemical manufactures, etc. all other sorts **Value**	£1,019,997	£280,518
Dyes and Dyestuffs—	Cwt.	Cwt.
Synthetic organic dyestuffs	2,010	846
Extracts for dyeing	1,726	1,535
Extracts for tanning (solid or liquid)	134,266	31,982
All other dyes and dyestuffs	194	533
Paints and Extenders—		
Earth colours (except black)	21,588	13,641
Carbon blacks from natural gas	85,348	32,044
Value of carbon blacks	£359,108	£104,516
	Cwt.	Cwt.
Other, including vegetable, lamp, acetylene and bone black	18,086	3,808
Value of paints and extenders	£497,996	£179,136
Value of chemicals, drugs, dyes and colours	£3,133,527	£1,566,361
	Lb.	Lb.
Essential oils (other than turpentine)	546,365	420,112
Value of essential oils	£481,968	£309,817
	Lb.	Lb.
Synthetic oils	7,267	5,112
	Cwt.	Cwt.
Mineral jelly	20,617	15,698
Wax, petroleum, paraffin wax	74,730	30,008
Value of oils, fats and resins	£10,424,649	£8,507,859
	Tons	Tons
Sulphur	35,171	44,002
Value	£357,744	£368,087
	Cwt.	Cwt.
Gas and chemical machinery	1,177	22,093
Value	£34,303	£253,166
	Cwt.	Cwt.
Plastics materials	16,770	13,623
Value	£486,896	£327,153

WORKS SAFETY

A "Must" for Chemical Engineers

NEARLY 250 representatives of the chemical industry attended the third Chemical Works Safety Conference held at Scarborough from September 29 to October 1. In his opening address Professor G. M. Newitt, president of the Institution of Chemical Engineers, emphasised the value of introducing a study of safety measures at an early stage in the training of chemical engineers. He suggested that parties of students should be allowed to visit chemical works in order to study firms' safety measures. Three of the several papers presented at the conference were "Fire Hazards and Precautions in the Petroleum Industry" by E. E. Chanter, of Shell, Ltd.; "Fire Hazards and Precautions in the Manufacture and Use of Solvents" by J. Howlett, of the Distillers Co., Ltd.; and "Investigation of the Causes of a Fire" by Dr. J. B. Firth, of the N.W. Forensic Science Laboratory.

The conference was organised, as in the past, by the Association of British Chemical Manufacturers and the Royal Society for the Prevention of Accidents.

Fatal Accidents Increase

DEATHS from industrial accidents in the United Kingdom, showed a sharp increase in August. The total of 141 compares with revised figures of 120 in the previous month, and 132 in August, 1949.

Only four fatal accidents were associated with the chemicals, oils, soaps and kindred industries. Metal conversion and founding accounted for six and other metal trades one. There was one death in the group concerned with textile printing, bleaching and dyeing, while clay, stone, cement, pottery and glass accounted for two and gas works two.

Cases reported under the Factories Act or the Lead Paint (Protection against Poisoning) Act, 1926, in August, numbered 49, but there were no deaths. The incidence was as follows:—

Lead poisoning, seven; (shipbreaking, one; vitreous enamelling, two; electric accumulator works, one; other industries, one; painting of buildings, two); other poisoning (aniline), one; anthrax, two; epitheliomators ulceration (skin cancer) 30 (pitch, 17; tar, 11; oil, two); chrome ulceration, nine (manufacturing of bichromates, three; chromium plating, five; other industries, one).

Coal Production Level Maintained

Output of coal for the week ended September 30 was 4,242,000 tons. This was the sixth successive week that production in U.K. mines has exceeded 4 million tons.

GROWING OUTPUT OF ANTIBIOTICS

The Contribution of Mechanised Packaging

IN the past few months, considerable reorganisation has been carried out in the penicillin secondary production plant of the antibiotics unit at Barnard Castle, Co. Durham, resulting in increased productivity and a substantial saving of labour. This satisfactory state of affairs has been brought about partly through a progressive policy of packaging mechanisation and partly through schemes which Glaxo Laboratories, Ltd., has formulated with much expert knowledge of the problems for the speedy handling of materials

Originally a team of packing belt operatives (one chargehand and 17 assistants) was able to handle between 13,000 and 15,000 vials a day, but they were restricted in output on two counts. First, the old semi-automatic labelling machines, while performing good service, were limited to handling on an average only 27 cartons a minute and, secondly, following the labelling operations, the packing teams were required to perform a number of manual operations, which were markedly time-absorbing. Today the packing floor is being rapidly converted to automatic units, and the output of each line is now 65 cartons a minute, with a daily output of over 25,000. Two major contributions to this increased productivity have been the installation of completely automatic labelling machines and ingenious cartoning equipment which automatically handles corrugated liners, vials and leaflets.

Automatic Sealing

Penicillin cartons now leave the packing belts in attractive sleeve packs and thence go to newly installed fully automatic cellophane wrapping machines. On these machines the packs are completely sealed in cellophane at the rate of 30 a minute—an astonishing improvement over the old manual methods, which produced an average of three a minute. The assembling of packing materials in a store adjacent to the packing floor to permit of easy accessibility and the operation of a system allocating each batch of penicillin to its own packing team, are important aids to the general efficiency.

This general acceleration serves a need additional to the national need of increased productivity. It has a specific, local urgency. The Barnard Castle secondary production unit has recently been called upon to handle not only the whole of the penicillin output from its own primary production section but to accept also the growing production from its sister antibiotics plant at Ulverston.

By courtesy of Glaxo Laboratories, Ltd.

One of the accelerated processes at Barnard Castle

The other units in the secondary production block, operating with similar efficiency and as part of the drive for maximum handling capacity, are working to an ingenious "flow-line"—or belt—system, beginning, logically, with the vial and bottle washing section. Here, in a large, yellow-tiled room, with fluorescent lighting, inverted vials and bottles are inspected for chips and cracks and then thoroughly washed on semi-automatic machines. Cleansing is by detergent solution, followed by clean water wash, and the subsequent rinsing is by distilled water from high pressure jets. The containers remain in sterilising ovens for four-and-a-half hours at 150° C. Rubber bungs are simultaneously washed in household washing machines, rinsed in distilled water, drained and centrifuged, and are sterilised in steam autoclaves (rubber bungs would perish in the extreme dry heat needed for sterilisation). Finally the bungs are left to dry in a hot air oven. Sterilisation of all the machine parts likely to come in contact with penicillin is carried out in autoclaves in this department and, beforehand,

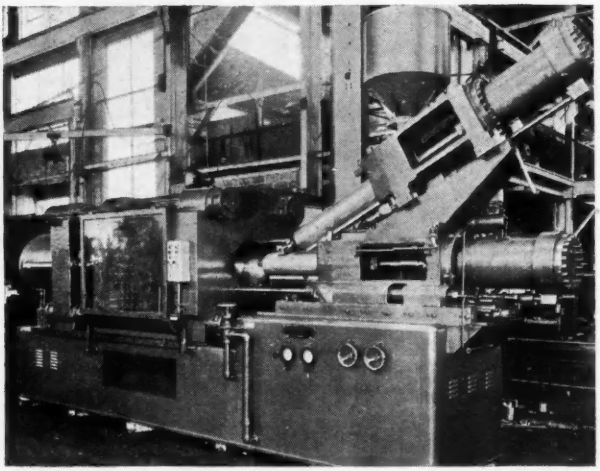
(*continued at foot of next page*)

The Largest Injection Moulding Machine?

Wide Range of Industrial Products Possible

THE injection moulding plant installed at the A. L. Hyde works at Grenloch, New Jersey (shown here) is claimed to be the largest machine of this kind in the world. Designed and manufactured by the Watson-Stillman Co., New Jersey, it is capable of pressing out at one time thermoplastic products weighing approximately 200 oz. This compares with plant originally installed by the Hyde company 18 years ago which could injection mould plastic products weighing only one ounce.

The new machine, which weighs 115,000 lb., is operated by a 60 h.p. motor and has a nozzle pressure of 21,000 p.s.i. Overall dimensions are: 24 ft. 8 in. long; 5 ft. wide and 12 ft. 11 in. high. The size of the platen is 60 by 40 in. and there is a 54-in. daylight opening. The hopper holds 300 lb. of plastic materials and the clamping capacity is 1000 tons.



The increased capacity of this new equipment—a 60-oz. injection machine was formerly the largest—will enable a far wider range of industrial and commercial products to be manufactured. Among the promising current uses of such plant is the production of exceptionally large refrigerator and radio components.

GROWING OUTPUT OF ANTIBIOTICS

(continued from previous page)

care is taken to ensure that each part is wrapped in glacine paper. When required for use the machine parts are installed under aseptic conditions. Demineralising of the water used in the washing unit is carried out in this department.

Inside the filling hall a new type of filling machine is being used with marked success. Penicillin is fed from a hopper through finely adjusted worm feed which delivers a specified quantity of the drug to each vial. Careful statistical control of the weight of penicillin delivered to the vials necessitated by variations in the bulk density of the drug. To avoid undue compacting of the material an operator-controlled vibrator maintains a steady flow of penicillin into the hopper. Every machine in the filling hall is capable of handling up to 7,500 vials a day.

When filling operations are complete, rubber bungs are fitted aseptically. From the dry filling hall the trays of vials go for sealing and capping on multihead sealing machines.

U.S. Helium Plant Re-Started

Steadily increasing demands for helium for military and civilian uses has caused the U.S. Bureau of Mines to reopen its Amarillo, Texas, helium plant for limited production. Production was suspended in August, 1945 after a decline in military demands. During the fiscal year 1950, industrial consumption reached 63.3 million cu. ft. of helium and the estimates for the current fiscal year indicate that about 80 million cu. ft. will be needed.

DETERGENTS FOR THE LAUNDRIES

Growing Dependence on Chemical Aids

THE scientific side of modern laundering was well represented at Olympia, London, this week at the first Laundry, Dry Cleaning and Allied Trades Exhibition held since the war. The exhibits of the British Launderers' Research Association illustrated many of its activities, including some of its research.

Apparatus shown included that used in an investigation of the fundamental problems of soil removal and soiling re-deposition in washing processes. This has been developed with the object of evaluating detergents by quick laboratory tests instead of prolonged laundry trials. The actual removal of soiling was demonstrated with the aid of a projection microscope. The procedure was demonstrated which has been developed for this laboratory evaluation of detergency in which soiled chopped-up fibres replace the orthodox soiled fabric test pieces. The reproduceability obtained is ±5 per cent.

Valuable Sodium Products

Among the exhibits of manufacturers of chemicals, that of ALBRIGHT & WILSON, LTD., showed some of the applications of Calgon (sodium hexa-metaphosphate) in the laundry industry. It gave practical demonstrations of its effect in the laundering of towels, showing how Calgon disposes of lime soap. A profile projector compared threads rinsed in the sodium chemical with others on which lime soap had been deposited.

Sodium metasilicate, stated to be used by two laundries out of three, was notable among the chemical supplies exhibited by ALCOCK (PEROXIDE), LTD. Chemicals for shower-proofing, moth-proofing and re-texturing of fabrics were the specialities shown by CATOMANCE, LTD. On the stand of HARDINGS (PENDLETON), LTD., attention was called to Harcolex, an emulsion of fatty acids specially adapted for the processing of heavily soiled work. Straight fatty acids of various titres were also shown.

LAPORTE CHEMICALS, LTD., offered a representative selection of its detergents and auxiliary products for the laundry washroom, including the standard builder Escolite, the various Escolite soap blends, and the several synthetic detergents for use in hard or soft water.

IMPERIAL CHEMICAL INDUSTRIES, LTD., Dyestuffs Division, had a full display of detergents, water-proofing agents, dyestuffs, stiffening agents, polishes for collars, and mildew inhibitors.

The principal exhibits of SHELL CHEMICALS, LTD., were Lensex detergent products, of which practical demonstrations of ready solubility, instant wetting and non-gelling were given. The non-gelling quality obviates the pre-heating of stock-tanks. Among the specialities exhibited by S. & D. CHEMICAL MANUFACTURING CO., LTD., were various soaps and wetting agents and Puropol "S", a special sulphonated castor oil for use in hard water.

Most of the well-known soap manufacturers were exhibiting, including some which also manufacture petroleum-based and other synthetic detergents.

The GAS COUNCIL'S stand, illustrating the latest gas and coke-fired appliances designed for laundries and dry-cleaning establishments, stressed the value of the cleanliness of gas as a fuel. Unfortunately, some of the exhibitors relying on this source of heat were badly hit by the gas strike and had to abandon their demonstration plans.

The Rising Cost of Solvents

INCREASES in the prices of many derivatives, recently forecast by Mr. H. J. Ross, in view of the large rise in molasses prices, were announced on Monday. The new prices announced by the Distillers Company group show the following increases:

Plain British spirit, 4d. per proof gall. for all grades; methylated and other denatured spirits, 6½d. per bulk gall. for all grades; Glacial acetic acid (per ton), £11; all other grades, £8; acetic anhydride, £8; methyl acetate, £7; ethyl acetate, £10 10s.; isopropyl acetate, £12 10s.; butyl acetate £12; amyl acetate (BSS and technical), £8; butyl alcohol, £7 10s.

Kemball Bishop & Co., Ltd., on Monday notified a rise in the price of citric acid to 1s. 7d. lb., less 5 per cent, for 5 cwt. lots.

Notifications of price increases on an equivalent scale affecting about 30 solvent materials were also notified this week by A. Boake, Roberts & Co., Ltd. These range from £8 per ton for 80 per cent acetic acid to £27 more for di-acetin.

AMERICAN PACKAGING METHODS

Increasing Use of Thermoplastic Containers

THE standardisation of container types to cut forwarding costs and the help given by abundant plastics container materials and technology were some of the main points stressed in the productivity report on "Packaging" made by a specialist team which visited the U.S.A. earlier this year.

The report, published this week by the Anglo-American Council on Productivity, also calls attention to the greater use of power and mechanical equipment in the U.S. factories than in the British counterparts. Members of the team were much impressed by the U.S. workers' co-operative attitude towards new methods, incentive schemes and mechanisation. Such equipment had markedly raised the output of the American worker, although he did not have to work any harder.

Materials Used

The productivity team, although concerned with packaging methods rather than materials, made a fairly full survey of the wide development in the U.S.A. of plastics packaging materials. It noted the following plastics in use for packaging:

Thermosetting: Phenolics, ureas, melamines. Thermoplastic: Acrylies (Perspex), cellulose acetate, cellulose acetobutyrate, ethyl cellulose, polyvinyl chloride and vinyl copolymer (chloride-acetate), polyvinylidene chloride (Saran), polyethylene, polystyrene, rubber hydrochloride (Pliofilm).

In addition, the use in packaging of several other plastics, namely, nylon, S-polymer (styrene, isobutylene co-polymer) is being examined.

The six main applications of plastics in packaging were as film, in fabricated containers, as moulded containers, closures and coatings and in adhesives.

Cellulose acetate (from 0.005 in. to 0.021 in. or thicker) is the material mainly used for fabricated plastic containers. Shape and design are similar to those available in this country, but interesting developments are taking place in the methods of fabrication.

For rectangular and cylindrical containers, automatic and semi-automatic methods have been developed for fabrication up to speeds of 1000 per hour—with a consequent reduction in cost. Machinery for edge beading (both internal and external) is available. Folding boxes are being made from cellulose acetate.

There is an increasing use of thermoplastics for moulded containers: polystyrene, cellulose acetate, cellulose acetobutyrate, polyethylene, the vinyl resins and the acrylics (Perspex) all being used.

Because of the greater availability of the resin, polystyrene containers are more common in the U.S.A. than in Britain, and are used not only for the packaging of luxury goods, but also for everyday articles. Polystyrene has many attractive features as a packaging material (comparatively low cost in the U.S.A.), good transparency and good finish. A special shock-resistant polystyrene has recently been announced which it is stated will overcome the inherent brittleness of the normal polymer.

Polyethylene (polythene), a British discovery, is enjoying a wide use in America as a packaging material in the form of film, tube, coatings and closures, as well as for moulded containers. It is chemically inert, non-toxic, odourless, tasteless, has good resistance to the penetration of water vapour and liquid water, and is flexible.

These properties render it suitable for a wide range of packaging applications, while its flexible properties enable it to be used for the manufacture of "squeeze bottles," for packaging and dispensing powders (insecticides, etc.) and liquids (sprays, etc.). Plant for making this type of container is operating in this country.

Cost of Polyethylene Bottles

The cost of polyethylene bottles in the U.S.A. is about 2½-5 times that of glass: in Britain the price ratio is about 10-1.

Rigid bottles made from polystyrene and cellulose aceto-butyrate are not being used in any large quantity.

Closures used in the U.S.A., so far as the thermosetting plastics are concerned, are similar to those in Britain. Phenolics, ureas, and, to a less extent, the melamine resins, are used.

A number of interesting applications of polyethylene as closures were seen where advantage could be taken of its flexibility, for example, "hinged" closures and, for a metal drum, a spout which after used could be pushed back into the drum and covered with a metal cap.

Plastics were also being used in some of the newer adhesives which have quicker setting properties, firmer adhesion, increased resistance to water, and less tendency to attack by moulds and insects. Polyvinyl acetate is used in many of the newer emulsion type adhesives and some

of the hot melt cements contain vinyl resins.

The problem of finding a satisfactory ink for use on polyethylene was said to be on the way to being solved.

The team considered it significant that polyethylene is favourably priced as compared with Pliofilm and only fractionally more expensive than moisture-proof transparent cellulose, and cellulose acetate films. This fact accounts for the wide use of polyethylene in the U.S.A. The qualities which give the material its popularity are a lower water vapour transmission rate than all the other films except Saran (twice the price) and complete flexibility at sub-zero temperatures.

Great Future for Polyethylene

Observations in chemical industry show that polyethylene film has a great future. Already it is used as a liner for fibre drums and similar applications, thus facilitating re-use; there is no contamination of the drum and caking of hygroscopic substances is prevented. For viscous commodities the contents of a bag or liner can be squeezed out to avoid waste through adherence to the inside of the container.

The film produced in America is not as clear as the British product because of a difference in the basic molecular weight. Most converters of the film extrude it themselves in both tube and flat sheet form from the granule.

With the general abundance of raw materials for packages in the United States, the glass container meets considerable competition. Weight and space factors are also important.

Glass and Fibre

In the pharmaceutical field, the use of type 1 glass (" neutral " glass, or glass of high chemical durability) is restricted to containers for liquid injection products, and even here the use of type 3 glass (ordinary good quality soda-lime) is increasing. For example, penicillin products have been packed in type 3 glass vials by one pharmaceutical firm for several months, with complete success.

The use of type 2 glass (ordinary soda-lime glass sulphured in the lehr to improve chemical durability) was stated to be small and decreasing.

Wide use is made of solid fibre drums. The basic material is pure, unbleached, kraft paper, convolute wound. These drums are rapidly replacing the wooden cask, which is uneconomical to store owing to its shape and is affected by changes in humidity.

During a visit to a chemical manufacturing plant, it was observed that a patented fibre drum, embodying a toggle-operated steel closure, was used for the intake and storage of bulk supplies of powders. For the despatch of smaller quantities of products, a complete range of all-fibre drums was used, some constructed to suit the special requirements of the commodity, for example, with water vapour permeability barriers and liners. Loose, flexible polyethylene bags are placed inside these fibre drums, forming a container for pastes and greases. The bags are sealed by tying round the neck, the lid is placed in position and sealed with an adhesive tape containing glass-fibres.

The British team was under the leadership of Mr. G. M. Ashwell (Imperial Chemical Industries, Ltd., with Mr. A. F. Cowan (Metal Box Co., Ltd.), as secretary and included the following members: Mr. W. A. G. Pugh (Cascelloid, Ltd.), Dr. G. L. Riddell (Printing, Packaging & Allied Trades Research Association), Mr. J. H. Singer (Glaxo Laboratories, Ltd.).

Among the sponsors of the team were: the Institute of Packaging, Association of British Chemical Manufacturers, British Plastics Federation, Printing, Packaging and Allied Trades Research Association and the Glass Manufacturers' Federation.

To make widely available the results of their investigations in the U.S.A., members of the team attended an exhibition of packaging samples at the Waldorf Hotel, London, W.C.2, on October 5, which included specimens they had brought back from the U.S.A., and answered questions on American methods. The display and the discussion were sponsored by the Printing and Allied Trades Research Association.

Leather Chemists' Conference

THE importance of the work of technical committees was stressed by Mr. G. Jessup Cutbush during his presidential address to the annual general meeting and conference of the Society of Leather Trades' Chemists held at the University, Leeds, last month.

The president announced that the Donald Burton Prize for 1950 had been awarded to Dr. D. G. Roux, of the South African Section, for his paper on " The Purification of Black Wattle Tannin and Its Effects on Combustion Analyses."

The healthy financial position of the association was indicated by Dr. D. Burton (hon. treasurer), whose proposal that a Society of Leather Trades' Chemists Scholarship and Research Fund should be formed was approved.

During the two-day conference six technical papers, including the Fourth Procter Memorial Lecture by Professor E. K. Rideal, F.R.S., were read and discussed.

Packaging Petroleum Equipment

A *Specialist's "Ten Commandments"*

REQUIREMENTS of the petroleum industry overseas are not confined to highly specialised petroleum equipment. They embrace practically every kind of industrial, mechanical, electrical and scientific equipment, and may include the many other things needed to create and maintain the townships and ports associated with the oilfields. The packaging problems presented by such a wide range of goods for long-distance journeys are accordingly very exacting.

"Ten good commandments," which should be borne in mind to procure the safe despatch and delivery of equipment were given by Mr. J. Evan Cook to members of the Council of British Manufacturers of Petroleum Equipment when they visited, last week, the Peckham and Surrey Docks packing plants of Evan Cook's Packers, Ltd.

His axioms were these: (1) Deliver the machine to the packer clean and rust free. (2) Don't paint over rust in your own shops; hiding corrosion won't prevent it spreading. (3) Don't assemble precision surfaces together without first cleaning and treating with a corrosion inhibitor. (4) Protect the product from contamination by dirt, dust, damp and finger-prints while awaiting packing. (5) Secure every product in a manner that prevents all movement within the case. (6) Secure every component part of a product which could possibly break off or easily break loose. (7) Insert padding between castings and other damageable or corrodable components and the wood members of the packing case. (8) Insert anti-crush stretchers. (9) Line the case with waterproof material. (10) Build the case to fit the product after dismantling as many protrusions as possible to save shipping space.

A further piece of advice was that more consideration should be given to simplify all-welded structures that cannot be dismantled. In many instances the job consisted of "four legs surrounded by 90 per cent air," for which the shipping company charged the same rate as if it contained something useful.

This, said Mr. Cook, was a high price to pay for shipping legs. Wherever possible, detachable legs should be supplied which could be packed somewhere else in the case at half the shipping price.

Iron Catalysis in Fuel Research — Use of Radioactivity

FUEL chemists in the U.S.A. have been using alcohol, rendered radioactive, to reveal fundamental facts relating to the production of petroleum by synthesis from coal. This research, by the Mellon Institute with help from the Atomic Energy Commission, is making clear some obscurities concerning the mechanism of metal catalysis in a branch of fuel research which, in America, is regarded as an essential insurance against any future shortfall in natural petroleum supplies.

Members of the Mellon Institute Research team recently described to the American Chemical Society at its 118th meeting in Chicago some new information concerning iron catalysis made possible by study of the behaviour of radioactive ethyl alcohol.

"For a number of years, some of the research workers in the field of synthetic gasoline had postulated that carbon monoxide and hydrogen, combine on the surface of an iron catalyst to form simple alcohols and that these serve as starting points for building up the familiar hydrocarbon molecules of petroleum, oils, wax, etc.

Now, radioactive ethyl alcohol has been added to the carbon monoxide-hydrogen mixture passing over the catalyst. Analysis of the hydrocarbons formed showed that each standard unit volume of hydrocarbon vapour had the same radioactivity, regardless of the number of carbon atoms in each molecule. It is presumed that ethyl alcohol molecules are capable of adhering to the catalyst surface and serving as starting points for building up higher hydrocarbons. The present work has shown not only that ethyl alcohol molecules can act as starting nuclei in the catalytic hydrocarbon synthesis, but that the added carbon atoms predominantly build on only to one end of the alcohol molecule.

Utilising Waste Acid Liquors

In an attempt to utilise waste acid liquor discharged from steel works an experimental plant is to be erected in South Wales within the next 12 months. The plant has been planned by the British Iron and Steel Research Association and will produce about a ton of sulphuric acid a day.

EXPLOSIVES IN COAL MINES

Proposed Extension of Safeguards

INTERESTING facts about the uses of explosives in coal mines, put forward by an investigating committee, as well as recommendations for the improvement of current practice, are included in a recent report "Safety in the Use of Explosives in Coal Mines" (HMSO, 1s. 6d.).

The report serves incidentally to reveal the increasing use of explosives since the war, both in total weight and in the number of individual shots. Since 1945 the total tonnage of explosives used has increased by nearly 30 per cent and since 1935 has increased by about 78 per cent. During the same period (1935-49), however, the tonnage of coal produced per pound of explosive used has fallen from 8.83 to 4.54.

Of considerable interest to those concerned with the manufacture of explosives is that after careful consideration the committee has concluded that "the time has now come when it would be appropriate to make permitted explosives compulsory where safety lamps are required to be used, and to allow non-permitted explosives only in places where naked lights are allowed." This is one of the more important proposed changes in a new draft of the Explosives in Coal Mines Order.

So far as the coal dust explosion hazard arising from shot-firing is concerned, it is considered that the proper course is to prohibit non-permitted explosives in any dry and dusty places.

The general rule, as set out in the new proposed order reads: "All explosives taken or used below ground shall be permitted explosives, except that explosives of a non-permitted type may be taken or used in any part of a mine, other than a main haulage road or main intake airway, where naked lights are allowed in accordance with Section 32 of the Act and which is not dry and dusty."

Suggested Alternatives

The committee has pointed out that a valuable method of reducing the use of explosives is to take fuller advantage of alternatives, such as Cardox and Hydrox, hydraulic coal bursters and similar devices. The safety precautions prescribed in these orders are of a much simpler nature than those relating to explosives.

It is recommended that all colliery managements should consider carefully whether they could reduce shot-firing by improvements in methods of roof control, or by the use of machines for coal getting which do not necessitate the use of explosives, or by the use of alternatives.

The report recalls that several orders have recently been made under section 61 of the Coal Mines Act, 1911, applying to individual mines and permitting charges larger than the present maximum of 28 ounces to be used in a shot-hole when drifts are being blasted through hard rock with large rounds of shots fired by delay detonators. In this way charges of up to 48 ounces have been sanctioned and used, but the committee believes that no demand is likely for charges exceeding 48 ounces. There does not appear to be any particular reason of safety why the present limit should not be exceeded when firing shots in rock in stone drifts which require a heavier charge.

Accordingly it is recommended that cartridges of permitted explosives for general use should be marked "not more than 28 ounces in coal or rippings and not more than 48 ounces in stone drifts." The recent orders authorising the use of a 48-ounce charge have required that the shot-hole should be of a minimum depth, usually six feet, and stemmed completely to the mouth.

Sheathing

Where permitted explosives are used, it has been suggested that all cartridges should be sheathed, as was recommended by the Royal Commission. The committee does not think that this should be required by law, since cartridges of equivalent safety, but with no external sheath, have now been developed (by I.C.I., Ltd., THE CHEMICAL AGE, *61*, 562). It is recommended, however, that only sheathed cartridges or their equivalent should be used for ripping shots in all mines where firedamp is a hazard.

The committee considers that it would be better if there was less variation in the diameter of explosives cartridges. Some small sizes are used only to a very limited extent in certain districts. It would clearly be of advantage both to the users and the manufacturers if the number of different sizes in use could be reduced. The larger diameter cartridges are, in general, preferable to those of smaller diameter. It is not thought that the order need prescribe any specific diameters, but it is recommended that, as a matter of good practice, the use of cartridges of small diameter (say, under 1¼ in. excluding sheath) should be avoided.

CONTROL OF WEEDS ON THE RAILWAYS—II

Effects of Catalysts with Sodium Chlorate

by Ernest A. Dancaster, M.Sc., Ph.D., F.R.I.C.

THE continuous use by the railways of sodium chlorate, over so long a period, is an indication of its consistent action for killing weeds in general on the largest scale. That, however, does not invalidate the observation that much remains to be established concerning the mode of action and the disparity of some of the results of applications of sodium chlorate.

Bates[1] recalls that it can be demonstrated that sodium chlorate has a specific action on cellulose, and that the poisoning may be due to this. If so, it would explain why the action of the salt may be slow, and why there may be no visible result for several days and then a sudden collapse. The immunity of the fungi to chlorate poisoning does not disprove this view because fungal cellulose differs from that of the higher plants.

Doubtful Theory

It has often been stated that chlorate weedkillers act directly on the leaves and stems of plants and that the weedkiller should be sprayed on the weeds and not on the surrounding soil. One reason for adjusting the *p*H value of Atlacide to that of the plant sap is to facilitate the absorption of the solution. The addition of a spreader, a glue, soap or saponing in the proportion of 1 : 8000, is desirable to ensure that the hairs of the leaves and stems do not form air pockets and insulate the plant from the weedkiller.

The first tissue to be injured by the chlorate is the xylem, blackening of the phloem occurring later. The flow is strongly influenced by the amount of transpiration taking place, and therefore by those conditions which influence transpiration. The importance of transpiration to penetration and absorption of chlorate solution sprayed on leaves is also indicated by the results of experiments carried out on the amount of chlorate found inside and outside the leaves of plants sprayed with the solution and exposed to bright sunlight,[2] and by experiments on the effects of temperature (*see below*).

My own experiments indicate that equally good effects are obtained, whether the plants are sprayed or the surrounding soil. Field tests were carried out in which various species of weeds were sprayed over the leaves and stems with a 5 per cent solution of sodium chlorate, care being taken to keep any of the liquid from reaching the ground. Other plants of the same species were treated by applying the 5 per cent solution to the immediately surrounding ground, carefully avoiding wetting any part of the plants. With such a weak solution there was a greater probability of finding any small differences which might occur through using the two alternative methods of application than if a 10 per cent solution had been used.

No difference, however, could be observed in the results obtained with the two methods, except that the different species showed their usual varying degrees of resistance. Creeping thistles and docks were temporarily injured, but after a few days began to form fresh growth; all the other plants were killed outright within a week. Other experiments indicated that different strains of the same species, and even different individuals of the same strain differed in their powers of resistance to chlorate poisoning.

Laboratory tests were also carried out, in which the plants' roots were submerged in nutrient solutions so that they could continue to grow and thrive unless attacked by the chlorate. These were treated as follows :—

Sets		$NaClO_3$
A	in 500 c.c. solution containing	0.05%
B	" " " "	0.10%
C	" " " "	0.20%
D, E & F	" " " "	no chlorate.

Plant sets A, B and C were not sprayed, while sets D, E and F were sprayed on the stem and leaves in these proportions :—

Sets		$NaClO_3$	
D	sprayed with a	0.05%	solution
E	"	" 0.10%	"
F	"	" 0.20%	"

Effects Compared

No appreciable difference could be observed between the sprayed plants and those with their roots in the chlorate solution. As in the field tests, all the plants except the creeping thistles and docks were killed outright within a week. The creeping thistles showed a considerable difference when treated with solutions of different concentrations; with the weakest solution the plants recovered completely, even those with their roots in the solution producing vigorous new shoots 17 days after the beginning of the test; those treated with 0.10 per cent chlorate made faint attempts at recovery but ultimately died; those treated with 0.20 per cent solution died within two weeks without making any attempt at recovery.

The docks were more resistant; all ultimately recovered. Chlorate does not appear to be very effective against this plant in concentrations that are used in practice.

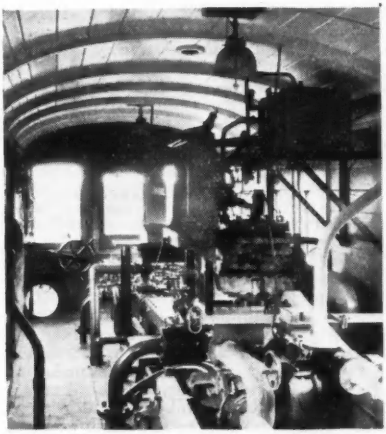
The growth of vigorous shoots even when submerged in chlorate solution suggests the possibility that the salt may have been used up during the first days of the test, so that the new shoots were actually growing in a medium free from chlorate. To test this, specimens of creeping thistle, dock and black nightshade were given this treatment: each plant was kept with its roots in 500 c.c. of an aqueous solution of sodium chlorate, some being placed in a 0.05 per cent solution and some in a 0.10 per cent, and one of the docks in a 0.20 per cent solution. The volume and concentration of the solutions were determined at the end of the test.

The concentration of chlorate remained constant within the limits of experimental error in all cases. The amount of solution taken up by the plants is shown in the table.

Plant	0.05% Solution		0.10% Solution		0.20% Solution	
	Loss in c.c.	Loss % Vol.	Loss in c.c.	Loss % Vol.	Loss in c.c.	Loss % Vol.
Creeping thistle	67	13.4	23	4.6	—	—
,,	20	4.2	24	4.8	—	—
Dock ... ,, ...	101	20.2	60	12.0	51	10.2
Black nightshade ...	16	3.2	9	1.8	—	—
,, ,,	38	7.6	16	3.2	—	—

Even testing so few plants renders it obvious that the amount of solution absorbed becomes appreciably less as the concentration is increased, and that the amount depends upon the degree to which the plant is affected. The black nightshades were quickly killed and they absorbed comparatively little solution, while the highly resistant docks took up a considerable quantity, especially of the 0.05 per cent solution.

One of the creeping thistles was of special interest. Although the plant is usually very resistant this specimen appeared to be allergic to chlorate as it suffered severely and quickly, although in the weakest solution, so that it was unable to absorb more than 20 c.c. before being killed.

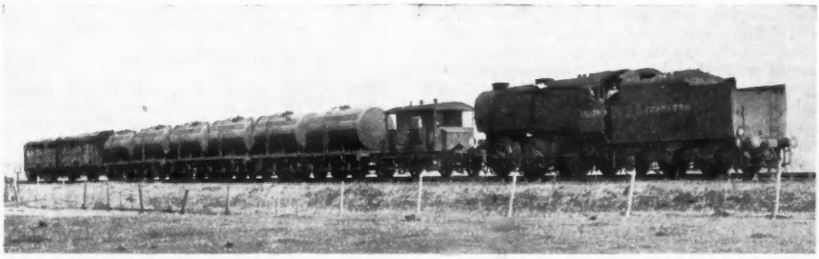


One of the "mobile pumping stations" through which the chlorate solution is delivered to the multiple sprays on the front of the train

The temperature also had a considerable effect on the amount of solution absorbed, and therefore on the damage done to the plant. The tests with the black nightshade were started late in September during a cold period, with the result that the plants were quite unaffected after 24 hours and had absorbed little solution.

The jars containing the plants were then placed in a room kept at 65° F. Within 24 hours at this temperature considerable deterioration was observable; the leaves were shrivelling and softening. After a further 24 hours the plants appeared to be quite dead and the leaves were being shed.

The main practical result of the tests is



[Photographs by courtesy of the Railway Executive

The magnitude of the requirement of chlorate solution is revealed by the number of tank cars used by this weed-killing train in the Southern Region

that they show that spraying can be started earlier in the year than is usual in practice. This, from the railway's point of view, is an important point because the large mileage to be treated renders it difficult to get the work finished before the weeds start seeding. It is, however, necessary to avoid spraying when the temperature is too low.

Changing the Balance

Different species of plants and different strains of the same species vary so much in their susceptibility to the poisoning effects of chlorate, that the possibility arises that trouble may come in the future through the elimination of the more susceptible plants and the consequent increase in the numbers of the more resistant kinds. So far, however, this does not appear to have occurred to any appreciable extent.

The fact that the soil does not remain sterile cannot be due to the small amount of chlorate used up by the plants, but must be mainly due to loss of the salt through dilution, washing away, and gradual decomposition.

Although sodium chlorate has so far proved to be the best weedkiller for use on railways, this does not preclude the possibility of increasing its poisonous properties. The most obvious way of doing this is by means of a suitable catalyst. Bates[3] tried a 10 per cent solution of sodium chlorate containing 0.02 per cent of vanadium pentoxide, and compared the results with those obtained with a 10 per cent solution of the chlorate only, and with a 0.02 per cent solution of vanadium pentoxide only. The trailing stems of bramble were treated by placing their cut ends in bottles containing 50 c.c. of solution. Not only were the stems treated with the solution containing vanadium attacked more rapidly and with greater severity than those treated with sodium chlorate only, but there was also a marked difference in the appearance of the plants. The stems became quite white for about a foot above the point of immersion, merging into pale yellow above this level. The leaves also took on a light yellow tint. In a field test the plants treated with the chlorate solution containing vanadium pentoxide could be readily distinguished from those treated with that containing sodium chlorate only. No effect could be observed when a solution of 0.02 per cent vanadium pentoxide was used. The catalytic effect of vanadium was not so marked when the solution was applied as a spray, but the poisonous nature of the chlorate was again distinctly increased.

Vanadium pentoxide is an expensive material and is only slightly soluble. It therefore appeared desirable to search for a more suitable catalyst and with this objective I tried various compounds of manganese, cobalt and nickel.[4] These metals were chosen because of their frequent occurrence in plant tissues, and in addition, the first two are known to play an important part in biochemical processes, probably on account of their catalytic action. Also, there was the well-known effect of manganese in facilitating the liberation of oxygen from sodium chlorate. The action of these compounds on sodium chlorate and on Atlacide was investigated, both in the laboratory and in field tests, and a few tests were also made with vanadium pentoxide.

For the laboratory trials the trailing stems of the Canadian blackberry, the wild bramble, and the wild dog-rose were employed. The cut ends of the stems were placed in tubes each containing 50 c.c. of the solution under test. The following solutions were used:—

Plant	Solution
Canadian Blackberry ...	10% $NaClO_3$
	with 0.03% $MnCl_2.4H_2O$
	,, 0.03% $MnSO_4.4H_2O$
	,, 0.02% M $KMnO_4$
	,, 0.04% $CoCl_2.6H_2O$
	,, 0.04% $NiSO_4.6H_2O$
	5% $NaClO_3$ only
	with 0.015% $MnCl_2.4H_2O$
	,, 0.015% $MnSO_4.4H_2O$
	,, 0.01% $KMnO_4$
	,, 0.02% $CoCl_2.6H_2O$
	,, 0.02% $NiSO_4.6H_2O$
	2.5 % $NaClO_3$ only
	with 0.015% $MnCl_2.4H_2O$
	,, 0.03% ,,
	,, 0.06% ,,
	,, 0.08% $CoCl_2.6H_2O$
	,, 0.08% $NiCl_2.6H_2O$
	,, 0.01% V_2O_5
Wild bramble	1 part 'Atlacide' concentrate : 3 parts water
	with 0.03% $MnCl_2.4H_2O$
	,, 0.04% $CoCl_2.6H_2O$
	,, 0.06% $MnCl_2.4H_2O$
	,, 0.04% $KMnO_4$
	,, 0.08% $CoSO_4.6H_2O$
	,, 0.08% $CoCl_2.6H_2O$
	,, 0.08% $NiSO_4.6H_2O$
	,, 0.08% $NiCl_2.6H_2O$
Wild dog-rose	2.5% $NaClO_3$ only
	with 0.015% $MnCl_2.4H_2O$
	,, 0.03% ,,
	,, 0.01% ,,

Solution Strengths

The 5 per cent solutions were used because a 10 per cent solution of sodium chlorate is more concentrated than that which was used on the Southern Railway. The 2.5 per cent solutions were chosen because it was thought such a dilute solution would kill the specimens very slowly, if at all, and therefore the effects of the catalysts would be more noticeable. Although the action was somewhat delayed with this dilute solution, all the specimens were killed in from 10 to 18 days, and the

action of the catalysts was no more marked than with the stronger solutions.

Similar results were obtained with all the catalysts, the lethal effect of the chlorate being increased in each case. This was indicated by the rate at which the specimens died and the changes which occurred in the leaves and stems. The vanadium pentoxide appeared to be the most potent, the leaves of the plants being more blackened and the stems more stained when this compound was used as the catalyst. Little difference could be seen between the effects of the other catalysts.

The amount of catalyst is important. The least effect is obtained with 0.01 per cent (calculated as anhydrous salt) and the greatest effect with 0.04 per cent. The solutions of the catalysts alone had no appreciable effect on the plants. These results agreed with those obtained by Bates with vanadium pentoxide. This was to be expected because dilute solutions of manganese and cobalt compounds are known to have a beneficial effect upon plants. Different strains of the same species again showed marked differences in their powers of resistance.

Small field tests were made on plots each 4 sq. yards in area, chosen so as to be alike as possible, though in fact there were considerable differences. The weedkiller used for these tests was Atlacide with and without the addition of a catalyst. The solutions were sprayed evenly on the plots, at the rate of one pint to each plot. In the first test the solutions used were as follows:

Plot No.	Atlacide	Catalyst
1	1 part concentrate to 3 parts water	None
2	" " "	0.015% $MnSO_4.4H_2O$
3	" " "	0.03% "
4	1 part concentrate to 5 parts water	None
5	" " "	0.015% $MnSO_4.4H_2O$
6	" " "	0.03% "
7	" " "	0.03% $CoCl_2.6H_2O$
8	" " "	0.015% V_2O_5

In the second test four plots were chosen. A and B were more uniform, and contained more resistant plants than C and D. The solutions used are shown below:—

Plots	Atlacide	Catalyst
A & B	1 part concentrate to 6 parts water	None
C & D	" " "	0.03% $MnCl_2.4H_2O$

A third test was carried out on the same lines as the previous one, but the Atlacide concentrate was diluted in the proportion of 1 part concentrate to 8 parts of water; the catalysed portion of the solution contained 0.06 per cent of $MnCl_2.4H_2O$.

Although differences between the plots made close comparison difficult, reliable results could be obtained by comparing the effects on particular species, such as the bindweed. It was evident that the manganese salts were effective in promoting the lethal action of the chlorate, especially where weak solutions ot Atlacide were used. The action of the other catalysts was not so definite.

The results of the tests were sufficiently promising to justify trials on a much larger scale. Two stretches of track in the running line and three sidings in a marshalling yard were chosen for the trials. The sites were examined before spraying took place, about a week after the operation, and again after an interval of about three months. At each site the track was divided into five parts which were sprayed as follows:—

Section	Atlacide	Catalyst
A	1 part concentrate to 3 parts water	None
B	" " "	0.03% $MnCl_2.4H_2O$
C	" " "	0.06% "
D	1 part concentrate to 5 parts water	0.03% "
E	" " "	0.06% "

All the solutions proved lethal, a satisfactory kill being obtained in each case. However, as a 1:5 uncatalysed solution is known to be definitely interior to a 1:3 solution, there was satisfactory evidence that the manganous chloride did increase the lethal properties of the Atlacide, because the 1:5 catalysed herbicide was as effective as the uncatalysed 1:3. Also, the addition of 0.06 per cent of manganous chloride gave better results than those obtained with only 0.03 per cent.

The results obtained from the large scale tests were considered so satisfactory that the following year the whole of the weedkilling on the Southern Railway was carried out with a solution containing 1 part of Atlacide concentrate to five parts of water, with 0.1 per cent of manganous chloride. Although the year was not a good one for weed killing, the results were on the whole satisfactory, and compared favourably with those obtained on other railways. A catalysed 1:5 solution of Atlacide concentrate was again used the following years.

The reports sent in by the inspectors were somewhat variable, probably because of differences in the weather conditions when the killing was carried out on the various sections. As a result of these reports it was decided to abandon the use of the catalyst and to revert to the original 1:3 solution. Further investigation of the use of catalysts for enhancing the lethal qualities of chlorate killers seems desirable.

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Reviewing Paint Problems

Colour Chemists Discuss Colour Control

FUGITIVE colours and the difficulty of avoiding gradual departure from established colour standards were considered in some detail at the opening session in London on September 27 of the Oil and Colour Chemists' Association. The meeting, at which the chairman, Mr. L. O. Kekwick, presided, was in the form of a "brains trust."

Unreliable Standards

In reply to a question asking what were the best methods of avoiding a slow drift of colour standards, Dr. R. F. Bowles said that he did not think there was a problem, provided the matter was tackled systematically and carefully. He believed there was a great deal of slap-dash work done in the preparation of the standards in the first place, and there was not sufficient care in storage; as a result, variations arose. Further, in the past there had been no method of measuring a colour when it was standardised; so that there had been some excuse until recently, when methods of measuring colour began to become available.

Attempts to maintain a standard in the wet form seemed to him illogical. A wet material was by its nature unstable, and in consequence, physical and chemical changes were bound to occur in a liquid that was kept for any length of time. There was sedimentation and in particular, differential flocculation of the various pigments—and possibly other chemical changes involving soap formation and so on, all of which might affect the colour.

Dr. Bowles thought that a standard should be kept in a solid state, *i.e.*, in the form of a panel, or a print. A really accurate colour measurement of the standard panels or prints must involve standard illumination and spectro-photometric data on the colour itself. It was essential to know how the actual colour specimen was made up. Particularly with secondary and tertiary colours, it was very difficult to make a satisfactory match by using mixtures of colours which were spectrally different.

In Dr. Bowles's opinion there was no excuse for saying that colour could not be measured. The instruments were expensive but the average works would think nothing of paying £1000 for a new piece of manufacturing plant. Therefore, they should not boggle at paying £500 or £600 for an instrument to measure colour accurately, and which was, in his opinion, equally important for carrying on business.

The chairman agreed that there seemed to be no possible course other than to use spectral methods. Dr. Bowles had pointed out that £600 would be well spent on an instrument from which a manufacturer could obtain figures on which he could reproduce colours. It was probable, however, that many firms could not afford it, even if they were in complete agreement with Dr. Bowles.

Yellowing

A question was asked whether there was any relationship between yellowing, on exposure to light and to moderate heat, with varnish and resin films, and how yellowing could best be assessed.

Mr. R. J. Ledwith (past chairman of the section) said he believed yellowing was due in many cases, to the nature of the drying oil present, and in some cases to the nature of the resin used; and, of course, the two effects frequently overlapped.

With regard to oils, it was generally believed that the amount of yellowing was affected by the proportion of linoleic acid present.

Discussing the yellowing of resin films as distinct from varnishes, Mr. Ledwith said it was in the paraffin phenolic resin films that one noticed the most phenomenal degree of yellowing. It was not clear what happened there.

The question concerning the assessment of yellowing, Mr. Ledwith suggested, might well be left. There were rough and ready methods, but obviously a quantitative colorimetric method was far preferable.

Mr. L. F. Parker said that if yellowing of a film could be correlated to its exposure to heat and light this would provide a speedy test to show whether or not a film would yellow. It appeared, however, that the yellowing varied with the nature of the radiation imposed on the film, and the correlation might vary also according to the particular type of resin or other chemical compound which was irradiated.

Oils and Fats Prices Unchanged

No change will be made in the prices of unrefined oils and fats and technical animal fats allocated to primary wholesalers and large trade users during the five-week period ending November 4, 1950.

Metallurgical Section

Published the first Saturday in the month

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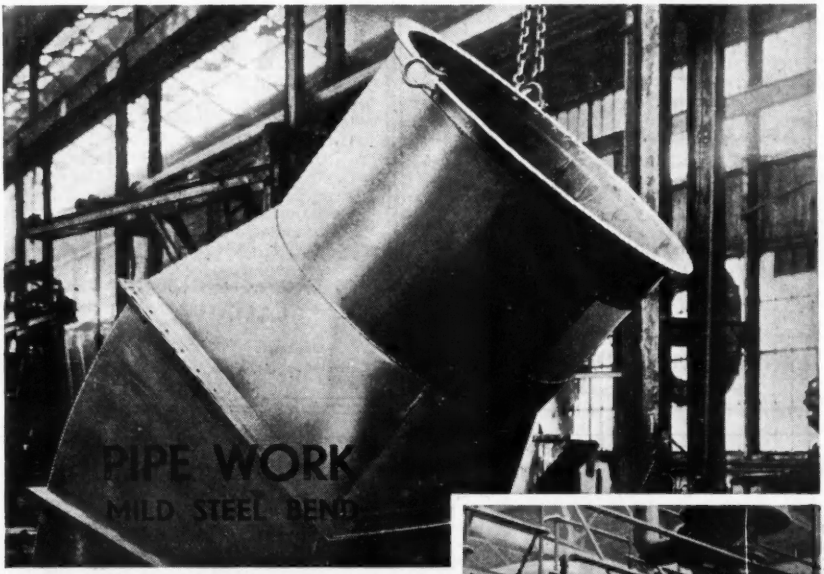

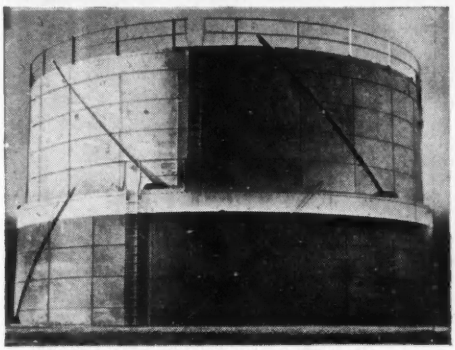

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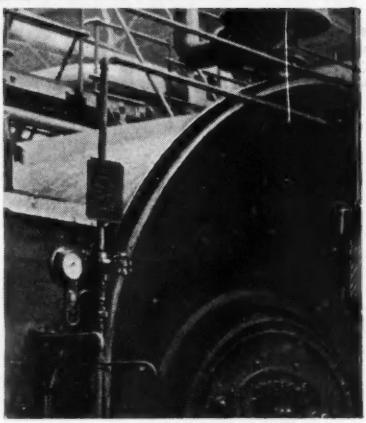

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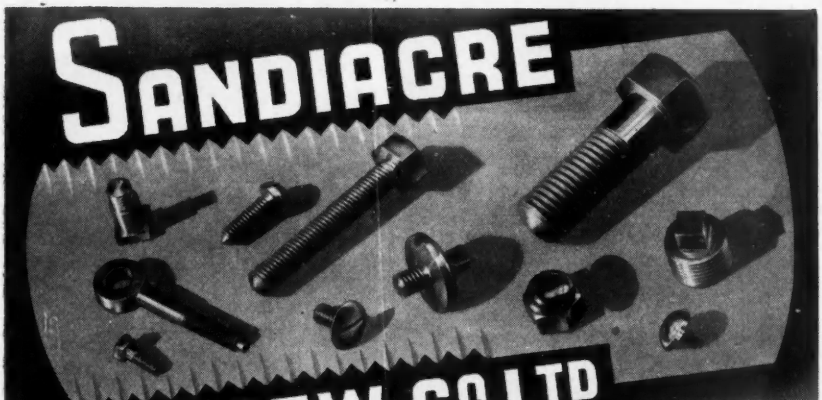
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Metallurgical Section

7 October 1950

RECORD STEEL PRODUCTION

"We Can Meet All Demands"

INTERESTING facts and figures relating to the output of British iron and steel are given in the Monthly Statistical Bulletin of the British Iron and Steel Federation for August. (*25*, 8, 1-6).

Referring to the relaxing of the control of steel distribution three months ago, the report says that the change was made possible by the steady growth of steel production and the consequent easing of the supply position—as had been evidenced by the accumulation of stocks in a period of high consumption. At 8,309,000 tons, the output of steel ingots and castings in the first half of 1950 was 4½ per cent above the corresponding 1949 figure (itself a record) and about half as much again as the 1935-38 average.

Increased Stocks

This record rate of production, reflecting the gradual expansion of steelmaking capacity and the high level of home and imported scrap supplies, has not been achieved at the expense of raw material stocks. On the contrary, the industry's stocks of pig iron and scrap are, respectively, 23 per cent and 18 per cent higher than they were a year ago, and are more than double the corresponding 1948 figures.

The further advance in steel production has been achieved with practically no addition to the industry's labour force. Hence, productivity per man-year (all workers) in steel melting and rolling rose by 8½ points, from 131.1 per cent of the 1938 average in January-June, 1949, to 141.6 per cent this year.

By helping to raise productivity and by reducing the need for imported semis, this advance in production has so far enabled the industry to absorb the cost of the increase in railway freight rates which came into force on May 15 (amounting to about £6 million a year) and so to keep steel prices stable at a low level.

Imports, which had amounted to 1,136,000 ingot tons in 1949, were only about 436,000 ingot tons in the first seven months of this year and are expected to continue at approximately this rate for the remainder of 1950.

In view of the reduction of imports, total supplies in 1950 cannot be much above the 1949 figure. Allowing for second-hand and re-usable material, the total may be tentatively put at 17.4 million ingot tons, against 17.2 million in 1949:

STEEL SUPPLIES FORECAST
(million tons—ingot equivalent)

	1948	1949	1950 (Estimated)
Crude steel production ...	14.9	15.6	16.2
Imports	0.5	1.1	0.7
Re-usable material, etc.	0.6	0.5	0.5
Total	16.0	17.2	17.4

Assuming, therefore, that total stocks are, on balance, maintained this year at the end-1949 level an extra three-quarters of a million tons of steel should be available, compared with last year, for consumption at home or abroad.

In concluding its survey of the first half of 1950 the report points out that any marked change in the pattern of industrial production—*e.g.*, a switch from tractors to tanks—would inevitably mean a temporary drop in productivity and therefore in steel requirements. There is thus no reason why the acceleration of the defence programme should cause any appreciable increase in total steel requirements in the near future.

FBI View of Steel Vesting

THAT any generally acceptable method that could be found to avoid the disturbance involved in nationalising the steel industry, would also have the wholehearted support of industries, has been stressed by the president of the Federation of British Industries, Sir Robert Sinclair. He said at a local meeting of the Federation at Huddersfield last week that he hoped some agreed basis might yet be found for postponement of nationalisation project. The arrangements for vesting and the setting up of the Steel Corporation and its subsidiary organisations must put a heavy drain on the time and thought of many whose energies and ability were important to defence.

Rising Exports of Non-Ferrous Metals

Substantial Reduction of Stocks

EXPORTS of non-ferrous metals in August were marked by notable increases in zinc concentrates and tin, compared both with the previous month and with August, 1949.

Stocks at the close of the period contrasted with the level at the same month last year showed these diminished totals (in long tons): blister copper 47,338 (57,619); refined copper 78,810 (92,329); slab zinc 54,662 (75,743); and tin 7667 (15,978). Production achieved some advances over August 1949: in slab zinc 5126 (4685); lead in concentrates 230 (145); and English refined lead 4813 (1861). Consumption generally remained at about the same level.

Data set out below is from the summary issued by the British Bureau of Non-Ferrous Metal Statistics.

UNWROUGHT COPPER

Long Tons

	Blister Copper	Refined Copper
OPENING STOCKS:		
Govt. and consumers'	49,559	77,312
Imports	4,779	19,604
PRODUCTION:		
Primary	—	5,487
Secondary	1,841*	4,677
CONSUMPTION:		
Primary	5,517	24,038
Secondary	—	13,968
Exports	4,133†	23
CLOSING STOCKS:		
Govt. and consumers'	47,338	78,810

* Rough copper.

† Includes 2971 tons of rough copper despatched to Belgium and 1162 tons of rough copper to Germany for refining on toll.

GROSS OUTPUT OF MAIN COPPER, ALLOY AND PRODUCTS

Unalloyed copper products	23,291 long tons
Alloyed copper products	20,953 ,, ,,
Copper sulphate	3,098 ,, ,,

UNWROUGHT ZINC

Long Tons

	Zinc in Concentrates (estimated gross Zinc content)	Slab Zinc (all grades)
OPENING STOCKS:		
Govt. and consumers'	37,398	58,168
Imports	13,674	8,311
PRODUCTION:		
Virgin and remelted	19*	5,126
CONSUMPTION:		
Virgin (incl. debased)	6,360	17,262
Remelted and scrap	—	5,918
Exports and re-export	450	—
CLOSING STOCKS:		
Govt. and consumers'	44,731	54,662

* Total production May-August, 1950.

LEAD

Long Tons

	Lead in Concentrates	Imported Virgin Lead	English Refined	Lead Content of secondary Scrap and Residues
OPENING STOCKS:				
Govt. and consumers' ...	—	68,001	5,993	—
Other stocks ...	65	—	—	—
IMPORTS	—	21,968	—	133
PRODUCTION ...	230	—	4,813	—
CONSUMPTION ...	240	13,459	4,688	6,918
EXPORTS	—	6	—	—
CLOSING STOCKS:				
Govt. and consumers' ...	—	75,189	6,118	—
Other stocks ...	55	—	—	—

TIN METAL

Long Tons

GOVT. AND CONSUMERS' STOCKS (at end of period)	7,667
IMPORTS	43
PRODUCTION	—
CONSUMPTION	1,782
EXPORTS AND RE-EXPORTS	3,378*

* Exports total 3362 tons, of which to U.S.A., 1815; Denmark, 225; Germany, 224; France, 189; Canada, 183; Sweden, 175; U.S.S.R., 125.

ANTIMONY

Long Tons

TOTAL CONSUMPTION OF ANTIMONY METAL AND COMPOUNDS	427
TOTAL CONSUMPTION OF ANTIMONY IN SCRAP	246

CADMIUM

Long Tons

TOTAL CONSUMPTION OF CADMIUM	46.95

Awards for Welding Investigation

THE Council of the British Welding Research Association has awarded the 1949 Welding Research Prize of £100 to Dr. K. Winterton, Mr. J. G. Ball and Mr. C. L. M. Cottrell for their joint paper describing "A New Weldability Test for Magnesium Alloy Sheet."

This prize has been donated by the British Oxygen Co., Ltd., which will provide a prize fund for three years for a competition relating to welding. The closing date for entries for the 1950 competition will be extended to December 31, 1950.

A single prize of £100 is offered again this year and will be awarded for the best paper submitted on a research into welding or its applications. The secretary, British Welding Research Association, 29, Park Crescent, London, W.1, is the source of information about this competition.

ACTIVE CENTRES ON METAL SURFACES

New Theory Follows Recent German Work

THE so-called "active centres" on metal surfaces are distinguishable from other surface areas because they have a much stronger adsorptive power. In a paper dealing with active centres Professor Dr. Otto Erbacher (*Angewandte Chem.*, 1950, *62*, 17, 403-404) says that only at these active points are hydrogen and other molecules so strongly adsorbed that the resulting deformation amounts to decomposition or solution (catalysis).

These reactions have long been used to determine by comparison the relative active surface areas. At the Kaiser Wilhelm Institute of Chemistry experiments have been carried out to determine the active areas on platinum metal by exchanging adsorbed hydrogen ions (or atoms) with noble metal ions corresponding to a monatomic film. After roll-polishing and heating to 1230° K. platinum was 42 per cent active, and after emery-polishing it was 87 per cent active.

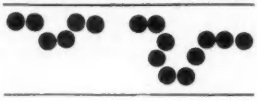

Fig. 1

From results of recent work the author has propounded certain views on the nature of these metallic active centres (*Zt. Elektrochem.*, 1949, *53*, 67). These are put forward as a working theory which supposes that all mechanically worked metallic surfaces are strewn with disturbed areas (Störstellen) of atomic thickness (Fig. 1).

Melting Points of Metals (Kelvin Scale)

Bi	544°K.	Au	1336°K.	Pt	2046.5°K.
Pb	600	Cu	1357	Ru	2223
Zn	692	Ni	1726	Rh	2239
Mg	930	Co	1765	Ir	2727
Al	931	Fe	1808	Os	2773
Ag	1233.5	Pd	1828	Ta	3303

The simplest case is that of metal atoms in one plane in which a single atom is missing. The interaction or interconnection of the typical activity spheres in the individual metal atoms is then only moderately enhanced. But because of their geometrical position neighbouring disturbed areas soon become affected and there is mutual interaction between activity spheres of such areas. These areas, which are still of atomic dimensions, are named "disturbance spots" (störflecken), and comprise the actual "active centres." Their surface energy is conditioned among other things, by the extent of superposition of activity spheres.

Apparently the only metals recorded in the literature as having active centres are those with m.p. above 1300° K, *i.e.*, Pd, Pt, Ir, Fe, Ni, Co, Ta, Cu and Au.

In an attempt to explain this phenomenon the possibility of a "healing" or clearing up process in these areas was considered. This would occur at a temperature at which the more or less exposed surface atoms are in motion (analogous with the Tammann softening point). In this connection, however, it would be necessary to know the maximum temperature reached during and after the formation of the outer surface layer. More particularly it would seem that, in the case of metals with m.p. up to about 1200° K, a temperature is reached sufficient to achieve this healing of disturbed areas—if the "healing" hypothesis is correct. Assuming this temperature to be two-thirds of m.p., then for 1200° K. m.p. it would be about 800° K. or approximately 525° C.

No Active Centres

If in the surface treatment of these metals, *e.g.*, by polishing with emery, etc.—sometimes at a purposely raised temperature—a temperature is reached in the outermost atomic layer only of 500-525° C., then, according to the "healing" hypothesis, the fact that metals with m.p. of 1200° K. (or less) exhibit no active centres would be explained.

If movement of the atoms in this outermost layer occurs at a still lower temperature than two-thirds of m.p.—which, from consideration of evaporation rates in radio-active metals is feasible—then a temperature of less than 500° C. in mechanical surfacing of metals would be sufficient to prevent the formation or continuance of active centres or disturbed areas. Such a friction temperature at the outermost atomic layer is by no means improbable if one considers, for example, the case of wire subjected to mechanical treatment—rubbing, polishing, etc.

In the case of the metals with higher m.p., such as gold, etc., the time factor is also important in regard to movement of surface atoms. It is to be expected that, with the same time and temperature as in the mechanical treatment of metal surfaces, the probability of movement in these atoms decreases with rising

m.p., thus giving a corresponding increase in active centre areas. In the few cases so far experimentally studied results have been obtained which are in accordance with these views.

Some results are quoted from earlier work (*loc. cit.*) and from a paper by G. Rienäcker *et al* (*Zt. anorg. Chem.*, 1948, *257*, 41) dealing with tests on gold, copper, and gold-platinum alloys. Activities were measured by means of hydrogen potentials, after various surface treatments, etchings, etc. Active areas disappeared when heated to red heat. These results, as far as they go, confirm the author's hypothesis.

Copper-Platinum Alloys

Rienäcker's work with etched copper-platinum alloys is described in some detail. After three hours of heating at about 1070° K. in a hydrogen atmosphere, pure copper showed a 10^4 smaller activity than pure platinum; and in the case of these two metals in alloy the activity of the Pt predominated out of all proportion to its content until the high Cu alloys were used, as shown in the curve (Fig. 2). This is especially so up to 16 atomic per cent Pt.

The author elaborates this curve in another figure to show that this persistently high activity of the platinum despite admixture with copper is explicable by his hypothesis (Fig. 3). Instead of logarithmic abscissae (as in Fig. 2) the author used both crystallising temperatures (°K.) and Pt activity percentage areas. It will be seen that up to 16 atomic per cent Pt and at about 1500° K. there is fairly close relationship showing a decline between Pt content and activity. This would seem to indicate that in this face-centred cubic crystallisation " nests " of Pt atoms are formed, and thus make possible the creation of Pt disturbance areas.

A further result of Rienäcker's work also agrees with the ideas already mentioned. Prolonged heating or tempering, with ordering of atoms, leads to corresponding activity losses (circle point in Fig. 3), *i.e.*, through clearing up of disturbance spots. Referring to the rather abrupt break in this uniform relationship between Pt content and declining activity (up to about 16 atomic per cent Pt), the author says that, unfortunately, no activity determinations were made between 16 and 2 atomic per cent Pt. However, one may probably agree with Rienäcker that this break does not occur with a Pt content much below 16 atomic per cent, since all alloys with still smaller Pt contents have m.p. less than 1500° K. This means that the two-thirds level would be exceeded by heating to about 1070° K, and the disturbance spots *ex hypothesi* would be eliminated (ausgeheilt).

Earlier Work

In some earlier work (*Angewandte Chem.*, 1944, *57*, 86) to determine hydrogenation activities of Cu:Pt and Cu:Pd alloys Rienäcker found that the greatest decline in activity occurred with substantially higher Pd than Pt content. Given the same preliminary treatment temperature, this would also be explicable by the author's hypothesis. Since the m.p. of Cu:Pd alloys is lower than that of the Cu:Pt alloys, the m.p. of 1500° K. is attained even with higher Pd content and the disturbance spots can be removed. It is, of course, not necessary that the critical temperature should always be two-thirds of m.p.: under special circumstances it

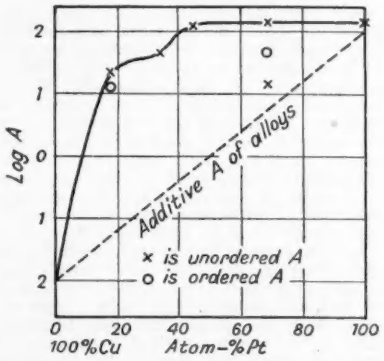

Fig. 2

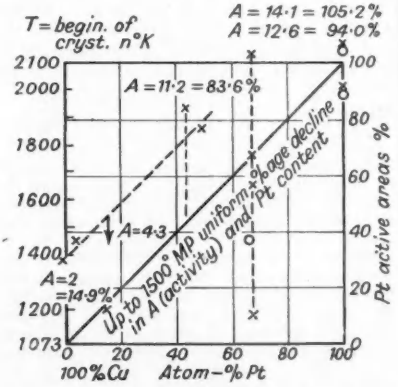

Fig. 3

may deviate considerably from this value.

It is interesting to note Rienäcker's result that by heating Cu and Pt and their alloys to 1070° K. for three hours a rather more marked loss in activity occurred *in vacuo* than in a hydrogen atmosphere. In the absence of external gas pressure it was possible that the more loosely held atoms at the surface become mobile at a much lower temperature, whereas the m.p. of the more compact and sol.d metal is lowered by only a few degrees. That there is a greater atomic mobility at the surface is also shown by the deposition on a noble metal of more or less imponderable radioactive isotopes of lead and bismuth. These isotopes completely vaporise at 650° C and 360° C. respectively, while the b.p. of the solid metals is 1750° C. and 1560° C. respectively at atmospheric pressure. It is therefore essential to know the maximum temperature to which the metallic surface is exposed, before or during the activation test.

If a solvent reactive with the metal is present another factor is introduced. For example, in the study of metal ion adsorption at the surface of previously polished nickel plate no preferential or superactive areas could be observed, although the polishing temperature was certainly below two-thirds of m.p. 1726° K, and Ni (as powder of a spongy type) is mostly used as a catalyst.

Tests were made using 0.1 N HCl at 79° C., and in 12 per cent HCl and in 0.1 N HNO_3 at ordinary temperatures for about 90 minutes, and only by long continued treatment could the gradual disappearance (solution) of the disturbance spots be effected. In certain conditions, therefore, solvent action must also be taken into account. On the other hand, brief action by a strong etching agent, *e.g.*, on the metal structure or lattice, may produce these disturbance areas, as was found with Au. Pt and with alloys of Cu : Pt and Au : Pt.

While investigating the active surface areas of Pt and Pd, the author found, rather surprisingly, that after polishing, Pd per unit surface area gave rather smaller figures than Pt with its higher m.p.

Although this behaviour is contrary to that generally found in the spongy form of these metals it nevertheless supports the hypothesis. The author is, however, careful to point out the tentative nature of his conclusions.

New Stable Fluorocarbons

THE production of new fluorocarbon compounds stable to red hot metals without decomposition, was announced at a recent meeting of the American Institute of Chemical Engineers. Because fluorocarbon acids are as strong as mineral acids and more stable than corresponding hydrocarbon acids, they offer a ready starting point for the synthesis of a variety of new organic compounds.

These fluorocarbons are attracting the interest of chemical, mechanical and electrical engineers as potential cooling liquids, lubricants. and dielectric fluids. The liquids have extremely low surface tensions, low refractive indices, and high compressibilities. Some of the bromide derivatives are very powerful non-toxic fire extinguishing agents.

The new compounds are made by an electrochemical process now patented by Minnesota Mining and Manufacturing Company. The company is now investigating application possibilities and plans to build the first unit of a manufacturing plant in the very near future.

Closing a Steel Factory

REFERENCE to the efforts by union officials and shop stewards to have the Ministry of Supply steel-making factory kept open at Linwood, Renfrewshire, was made in a statement issued by the Paisley District Committee of the Amalgamated Engineering Union. Mr. Douglas Johnston, M.P. for Paisley, is stated to have said on September 26 that the Board of Trade believed that there were possibilities that the Pressed Steel Company would employ more workers, and might play a part in rearmament. The factory, which employs 540, is considered uneconomic.

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The Chemist's Bookshelf

ADHESIVES. Selected Government Research Reports, Vol. 7. London, 1950. HMSO, Pp. 89. 7s. 6d.

The latest addition to the series, "Selected Government Research Reports", contains five reports which deal in turn with "Synthetic Resin Glues: Preliminary Study of Factors Affecting the Strength of Glued Joints in Aluminium Alloys", "Adhesion of Glues to Plywood" (two parts), "Tests to Determine the Effects of Various Types of Adhesives on the Final Shape of Laminated Bends", and "The Part Played by Formaldehyde in Dermatitis Attributable to Synthetic Resin Glues." Each report, which is prefaced by an abstract of the problems under consideration, gives a comprehensive survey of the factors involved in the production of synthetic adhesives, their use and performance. Part 2 of "Adhesion of Glues to Plywood" serves to illustrate the very adequate treatment of the subject matter. An abstract of the contents of the report is followed by an introduction. The next section lists the tests for gluing properties of plywood. Sections 3 and 4 deal respectively with the incidence of defective gluing with different kinds of wood and different kinds of glue. After this a section of 16 pages surveys factors contributing to bad adhesion. This is followed by a general discussion and the report proper ends with a review of remedies for case-hardening (Section 7). Finally there is an appendix. These reports are detailed and complete, are generously illustrated with photographs and diagrams and contain extensive graphical data.—P.M.

ANORGANISCH-PRAPARATIVE CHEMIE. Dr. Herbert Grubitsch, Springer-Verlag, Vienna. 1950. Pp. xxiii+480. Price £2 9s. 6d.

The student is not alone in needing working guidance; the independent research chemist also meets plenty of experimental difficulties and will be the first to recognise that only an exact practice, even by simple methods, can lead to incontestable results. The present book applies to all engaged in practical inorganic-preparative work, both the student and the research chemist. The author, who is professor at the Technical High School, Helsinki, obviously draws upon a long teaching experience, and endeavours to explain the most exact processes, giving practical manageable directions, as well as presenting the fundamental theoretical discussions. The book is divided into a first, general part (pp. 1-230), dealing with the techniques of the experiments specially for the inorganic chemist. The second, special part (pp. 231-460) reviews the stability of chemical compounds and discusses in detail more than 150 preparations, which are so chosen that a great variety of methods is represented. They are arranged according to the periodic system beginning with the non-metals and followed by the metals. There are many tables and 22 text-figures. The literature is comprehensively considered and a name and subject index facilitates the use of this very commendable text book.

Fusion-Welded Pressure Vessels

A DISCUSSION on the provisional British Standard Code 1500:1940 for fusion-welded pressure vessels for use in the chemical and allied industries will be held in the lecture theatre of the Institution of Civil Engineers, Great George Street, London, S.W.1, at 5.30 pm. on Tuesday, October 10.

The code (reviewed in THE CHEMICAL AGE, *61*, 907) covers new standards of construction and testing and is the first of a series of similar codes to cover forged vessels and other methods of construction, such as riveting, brazing, etc.

The discussion is being organised by the Institution of Chemical Engineers and will be opened by Mr. J. Arthur Reavell, chairman of the Drafting Committee. Developments and technical aspects of the code will be described by Mr. M. B. Donald, Mr. W. J. Strawson and Mr. F. Peel.

Several copies of the code (which may be obtained from the British Standards Institution, 25s. post paid) are available in the library of the Institution of Chemical Engineers, where members may consult them.

Technical Publications

COPPER tubes from 1 in. to 2 in. i/d (B.S.S. 659) can be bent to any angle up to and including 180° in the Staffa ratchet bending attachment manufactured by Chamberlain Industries, Ltd., Leyton. The attachment consists mainly of two components, the frame carrying the hydraulic pump, and the bending arm housing the adjustable back former pin.

* * *

THE important rôle of coking plants in the industrial and agricultural production of India is described in a well illustrated booklet " Coke Ovens in India," published by Simon-Carves, Ltd., Stockport. There are at present 14 batteries working in India, 11 of which have been built by the company. The 11 Simon-Carves batteries deal with over 3 million tons of coal out of the 3½ million tons carbonised annually in Indian coke ovens. They yield over 25,000 tons of ammonium sulphate for use as fertiliser, and some 15 million gal. of tar.

* * *

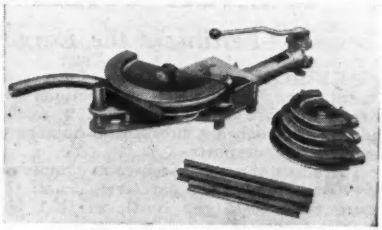
THE new revised bulletin E-1-2 of the Celanese Corporation of America contains details on performance studies of Celanese solvents 203 and 601 in nitrocellulose formulations. These tests are stated to indicate that the employment of Celanese solvents in both lacquer and thinner makes possible the use of higher solids, without sacrifice of blush resistance, drying time, or other properties. The 601 formulation will replace ethyl acetate or methyl ethyl ketone and 203 is proposed as a substitute for normal butanol and its equivalents.

* * *

A NEW form of furnace safeguarding equipment making use of the luminosity of the flame instead of its conductivity has been devised by Elcontrol, Ltd., London. It is of photo-electric type and is particularly suitable for use with oil burners. This and the company's other furnace safeguard unit, the probe type of equipment (FSC) intended for gas burning installations are compared in data sheet D.3, now available.

* * *

RECOMMENDED reagents and techniques for qualitative mineral analysis are given in the fourth report by the commission Internationale des Réactions et Réactifs of the International Union of Pure and Applied Chemistry. The report, divided into two sections dealing with cations and anions, is edited by Dr. P. E. Wenger and Prof. Y. Rusconi.



By Courtsey of Chamberlain Industries, Ltd.

Staffa ratchet bending attachment

* * *

THE ample technical and other descriptive matter issued by U.S. chemical trading groups is called to mind by the catalogue of surface active agents and organic chemical specialities issued by the Abrosi Chemical Co., Providence, Rhode Island. Among the new products listed are : Alrolenes, detergents for use in petroleum and chlorinated solvents; Alrosept MBC-50, an economical quarternary ammonium germicide; and Alrosperse 40K, an alkyl naphthalene sulphonate dispersing agent.

* * *

A SHORT but far-ranging survey of practical data about tinplate, is offered to buyers and users in the " Tinplate Handbook," by W. E. Hoare, B.Sc. (Eng.), F.I.M., A.I.P.E. (the Tin Research Institute, Greenford). Steelmaking and tinning processes used in the manufacture of both hot-dipped and electrolytic tinplate are summarised and the factors which determine the suitability of various types of tinplate for any particular application are discussed. There is also a useful English-French-German-Spanish glossary of technical terms of the trade.

* * *

THE importance of nickel alloys in aircraft construction is emphasised in a booklet issued by the Mond Nickel Co., Ltd., London, " Nickel Alloys in Gas Turbines." Nimonic alloys are used for rotor blading of every British aero engine gas turbine in production. Other parts made in one or other of the Nimonic series of nickel-chromium alloys include combustion chambers, turbine entry ducts, nozzle guide vanes and rings, high-temperature bolts.

OVERSEAS CHEMISTRY AND INDUSTRY

FRENCH CHEMICAL TRADE TOTALS

Fertilisers the Largest Export Group in 1949

CHEMICAL manufactures form one of the most active sections in French export trade taken as a whole, having established a substantial balance of exports over imports.

The effect of price increases in comparing 1949 with 1948 is comparatively small (no more than 10-15 per cent), so that last year's totals of chemical exports and imports—61.8 and 30.3 milliard francs, respectively, reflect a substantial advance. The pre-war export volume, however, has not yet been attained, if price increases since 1938 are taken into account. Despite the preponderance of exports over imports the chemical share of total exports is not quite so large—8 per cent in 1949 and 10 per cent in 1938.

The principal countries concerned in the French chemical trade and values of business in 1948-49 were as follows (in Fr.1 million). Imports (1948 figures in brackets): U.S.A. 8300.1 (5047.4); Switzerland 2958.0 (2544.4); Great Britain 2555.7 (2096.5); Germany 2375.8 (2008.9). Exports (1948 figures in brackets): Great Britain 4335.9 (1817.5); Sweden 4443.4 (2524.6); Netherlands 4142.1 (2445.8); Switzerland 3785.7 (2289.8); U.S.A. 1116.4 (1472.0) and among the French possessions Algeria 6036.9 (4451.1).

Predominance of Potassium

In the largest class of exports—fertilisers—potassium salts accounted for more than half the value in 1949, namely, Fr. 8342.7 million. Phosphates amounted to Fr.4648.6 million, while exports of nitrogen fertilisers were by comparison almost negligible.

In the heavy chemical field France is well equipped for exports, especially in alkalis. Principal exports are: soda ash, caustic soda, soda lye, aluminium oxide, caustic potash, sodium sulphate, calcium carbide, Ca, Ba, and Mg chlorides, Na and K chlorates, for which the best customers are Holland, Switzerland, Algeria, Belgium-Luxemburg, Argentine, England, and Morocco.

Exports of sulphuric acid are small—2782 tons in 1949 compared with 7894 tons pre-war. Most of the output is used at home and production has declined slightly during the last year or two. Other important products in the heavy chemical group are sulphur, bone black, hydrochloric, nitric, and phosphoric acids.

Chlorine manufacture has advanced considerably, to a total of 68,300 tons in 1949. By the end of the Marshall aid period, it is planned to increase output to 150,000 tons. Calcium carbide production, despite a small decline last year, is also on the upgrade. It is planned to increase output from 168,700 tons (the 1949 total) to 325,000 tons within the next two or three years. Chlorates and perchlorates have exceeded the pre-war level by a wide margin. Tabulated details for all leading inorganic chemicals in French production and trade are given by Dr. A. Metzner, Frankfurt, in *Chemische Ind.*, 1950 *2* (9), 458-461. Details of the organic and other sections will be published later.

EXPORTS BY CHEMICAL GROUPS IN 1949

(Frs. Million)

	Foreign Countries	French Dominions	Total
Inorg. heavy chemicals	9,618.0	2,719.4	12,337.4
Fertilisers	11,097.2	2,534.0	13,581.2
Org. heavy chemicals	2,727.8	389.7	3,117.5
Pharmaceuticals ...	4,183.2	4,217.9	8,401.1
Essential oils, perfumes, cosmetics ...	5,261.2	1,569.3	6,830.5
Org. dyes, colours, tanning materials, wood distil. products	5,129.6	825.3	5,459.4
Mineral colours and varnishes	499.7	1,455.9	1,955.6
Explosives, matches, etc.	197.1	570.6	767.7
Photochemical products	1,419.2	534.5	1,953.7
Plastics	554.4	183.7	738.1
Soaps, candles ...	1,024.9	2,048.9	3,073.8
Miscellaneous ...	1,649.8	1,449.5	3,099.3

IMPORTS AND EXPORTS RATIOS

(Fr. Milliard)

	1938	1947	1948	1949
Total imports	46.8	397.2	672.6	921.8
Total exports	30.6	223.3	434.0	782.0
Imports excess	16.2	173.9	238.6	139.8
Chemical exports ...	3.2	23.5	40.2	61.8
Chemical imports ...	1.7	15.4	20.5	30.3
Surplus of exports ...	1.5	8.1	19.7	31.5

Lignite Discovered in Austria

Deposits of lignite, estimated at between 25 and 30 million metric tons, have been discovered recently at Wolkersdorf, Carinthia, in the British zone of Austria. The depth of the deposit varies between 30 and 550 ft. It is expected that a daily output of about 2000 tons will be achieved during the next four years. Funds are being advanced by the ERP authorities.

GERMANY'S SYNTHETIC PETROL & RUBBER

Future of the I.G. Farben Factories

ECONOMIC experts of the U.S. High Commission in Frankfurt have let it be known that the Federal Republic is likely to be allowed in the near future to resume the production of synthetic motor fuel as well as buna rubber and a number of chemicals hitherto banned. They added, however, that only the production of limited quantities of synthetic fuels would be permitted, at least for the time being. This anticipated the decision of the Foreign Ministers' conference in New York.

As far as buna rubber is concerned, production possibilities in Western Germany in any case, are limited. Germany's largest wartime plant—the 70,000 ton works at Schkopau in the Soviet zone—has been working for some considerable time, though at a greatly reduced rate, but its output is not available for German consumption. In Western Germany there are two big works at Huels—whose former capacity was about 40,000 tons a year—and Ludwigshaven—30,000 tons. The buna installations at Ludwigshaven have been almost completely dismantled and at Huels, where one out of eight buna mills is still in position, an estimated DM.1 million would be required for investments to achive an annual production of 6-7000 tons of buna rubber. At Ludwigshaven the necessary re-investments would be much larger, and a considerable time would elapse before any worthwhile output could be expected.

Motor Fuels

The resumption of production of synthetic motor fuels in idle hydrogenation and synthesis plants is, as experience has shown, a much simpler proposition. The hydrogenation plant at Scholven, for instance, for which permission for resumption operations using mineral oils was granted on September 1, at first only for the treatment of crude benzol, is to be ready for operations in this limited field within eight weeks from the date of the receipt of the licence. Hydrogenation proper, on the basis of mineral oils, could start in about six months, according to expert calculations.

Economic considerations, however, do not favour oil-from-coal production in Germany. Apart from the fact that Ruhr coal is more expensive in relation to imported petroleum than before the war and is easily marketable, there is no overriding necessity to economise on imports of mineral oils. Because of this the majority view in Germany now is that the available hydrogenation capacity should be employed on treating crude oil. The domestic crudes from Emsland, which yield about 65 per cent of motor fuels if subjected to ordinary refining, can be made to yield approximately 90 per cent of motor fuels by hydrogenation.

Improved F-T Processes

Similarly, the special advantage of the Fischer-Tropsch plants before the war, *i.e.* their ability to provide an alternative outlet for coke when demand from the iron industy flags, is of little practical importance now. Nevertheless, Lurgi and others have worked on improvements of the process since the war, and certain processes of the Fischer-Tropsch plant have, in fact, been improved. The cobalt contact is being replaced by iron, and important improvements are also said to have been effected in the apparatus used. Attention has been paid in recent years to low-temperature carbonisation, with special regard to the production of such byproducts as phenols. An experimental plant using the Brennstofftechnik process was put into operation near the Langenbrahm mine at Essen a few months ago.

The first new successor companies under the I.G. Farbenindustrie law are to be set up before the end of this year, according to statements of the Allied High Commission, which maintain that the new companies will be quite capable of holding their own in competition with foreign chemical manufacturers. This view is strenuously opposed by the German critics of the law, who point to existing combines in the chemical industries of other countries as evidence of an allegedly inevitable and economically necessary tendency towards big units in chemical production. They pay no regard to the existence of special factors in the case of the German chemical industry.

All agree that the various I.G. Farbenindustrie units should be operated as efficiently as possible, but there are wide differences of views as to the best means of obtaining optimum efficiency. A number of I.G. Farbenindustrie patents in which the successor companies are not interested will be allowed to lapse unless the inventors wish to take them over.

NEW INDIAN PROJECTS

More Research and Production

THE Madras Government, recognising the importance of research in the development of industries, has sanctioned the establishment of a chemical testing and analytical laboratory to study processes for the fuller utilisation of the minerals and other raw materials available in the State.

The Government is also taking action towards establishing major industries like textiles, sugar, cement, vanaspathi and chemicals. The target for the expansion of sugar production in the State has been fixed at 120,000 tons a year, and for this ten sugar factories will be started. Ten vanaspathi factories will be started in Madras State, besides the two already working.

In the chemical industries, proposals have been made to start soda ash factories in the Tinnevelly, Guntur, Madura and Ramnad districts. At present there is only one factory in Madras State which produces caustic soda.

To augment petrol supplies, the Government has a programme for the installation of four power alcohol plants as adjuncts to the sugar mills at Vizagapatam, Bellary, Krishna and South Arcot districts. In regard to certain industries of all-India importance, such as iron and steel, magnesium and magnesium products, aluminium and ammonium phosphate, Madras has been urging on the Government of India the need to establish some of these industries in Madras.

The need for fertiliser plant and special advantages of the Mysore Government project have been emphasised by the Mysore Minister of Finance.

During the first half of 1950 alone, 400,000 tons of fertiliser have been imported, which suggests that, at the least, India's annual demand is 800,000 tons. The capacity of the Sindri fertiliser factory, now being completed, is only 350,000 tons and of Alwaye, 100,000 tons.

Diminished Chemical Output

India's output of certain important industrial chemicals in the first half of 1950 was as follows: sulphuric acid 49.5 thousand tons, compared with 89.0 thousand tons in the corresponding period of 1949; caustic soda 5.27 thousand tons (6.20); soda ash 23.55 thousand tons (17.91); liquid chlorine 2.15 thousand tons (2.61); bleaching powder 1.59 thousand tons (2.35); bichromates 0.90 thousand tons (1.79).

FERTILISER SUPPLEMENT

100,000 Tons for Ireland

THE Minister for Agriculture in the Republic of Ireland has arranged for the immediate importation of 100,000 tons of superphosphate, of 44 per cent water-soluble phosphate content. Low prices to users are to be quoted as an inducement to apply the superphosphate early. They will be revised at the end of the year. This importation is additional to normal supplies of Irish produced and imported superphosphate and takes account of the unsettled state of world affairs. The Minister has appointed as his agents for this superphosphate the Irish Sugar Company, of Dublin.

* * *

ONE of the most up-to-date margarine factories in Europe is going into production in the autumn at Drogheda, Eire. An important feature of the factory is that the entire process of manufacture is continuous from the moment the oil is pumped into glass-lined storage tanks to the emergence of packets from automatic wrapping machines. Details of the new factory, and an historical sketch of the McDonnells to whom it belongs, is given in the autumn issue of " Progress " (Vol. 41, No. 228), the magazine of Lever Brothers and Unilever, Ltd.

Dunlop Enterprise in Ceylon

A RUBBER factory in Kalutara and another in Avissawella, Ceylon, are to be opened shortly by Dunlop Plantations, Ltd. Land has been purchased at Kalutara as a site for the factory which will turn out all types of rubber goods.

The first all-rubber and canvas-rubber shoes to be made locally will be in the market early next month. The producing plant, near Colombo, is sponsored by the Ceylon Shoe Co., Ltd., and employs only Ceylon capital.

India Relaxes Import Licensing

The Indian Ministry of Commerce has announced further relaxation in the licensing of imports from soft currency countries. Licences are now freely available for the import of German and nickel silver, insulating materials, coal tar dyes, asphalt and gilsenite. Polystyrene may also be imported from any currency areas.

Lower Aluminium Production

Indian aluminium production, which rose to 3486 long tons in the first half of 1949, declined to 1698 long tons in the corresponding period of this year.

· OVERSEAS ·

Israel's First Asbestos Works

The first Israeli asbestos company has been established in Tel-Aviv with an initial share capital of U.S. $500,000. The daily output is planned to be some 9000 sq. m. of sheet.

U.S. Sulphur in July

The U.S. Bureau of Mines reports that 466,063 long tons of native sulphur were produced during July, 1950. This continued high level of production brought the total for the first 7 months of 1950 to 3,009,506 long tons. Apparent sales were calculated at 446,469 long tons, and at the end of July producers' stocks were 2,975,927 long tons.

Copper Sulphate Protection Proposal

Another appeal for protective legislation by chemical producing interests in India, the makers of copper sulphate, is receiving the consideration of the Indian Government Tariff Board. The board will consider representations from industries likely to be affected, consumers and producers of copper sulphate outside India. The Commercial Relations and Exports Department of the Board of Trade has expressed willingness to assist in making known the views of U.K. producers.

High Acid Resistance

Describing the exceptional resistance of phenolic resin products to most industrial chemicals up to temperatures of 375° F., Dr. R. B. Seymour (Atlas Mineral Products Company) told the recent annual meeting of the American Chemical Society about a phenolic resin-lined tank which had already surpassed the endurance which could be expected of stainless steel. After a daily charge of 100,000 gal. of boiling sulphuric acid, for steel pickling, the tank was "completely unaffected."

Argentina Safeguards "Critical Materials"

To curb profiteering and hoarding, the Argentine Ministry of Industry and Commerce has compiled a list of "critical materials" which cannot be disposed of without informing the government. Stocks, sales and prices of such materials must be declared at specified intervals. The list includes: Citric acid, arsenic, benzol, Solvay soda, quinine, caustic soda, rubber, scrap iron, steel, wire, cables, pipes, aluminium, nickel, copper, tin, chromium, magnesium, zinc, mercury, lead, uranium and asbestos, electrical equipment, meters, and motors.

Exploiting Sicilian Minerals

A company with large U.S. participation is being established in Sicily with the object of exploration and exploitation of the mineral wealth of central parts of the country.

Venezuela Iron-Ore Production

The U.S. Department of Mines has announced that iron ore from the high-grade deposits recently developed by the Bethlehem Steel Corporation at Cerro, Bolivar will be extracted for shipment to the U.S.A. at the rate of 13 million tons per annum by 1953.

Alkali Search in Western Australia

Temporary reserves of 5000 sq. miles in Western Australia are being granted by the Government to the Australian Mining and Smelting Company, of which Vacuum Oil and Zinc Corporation are the principal shareholders. The reserves are required to search for alkali and alkaline earth minerals, including sodium, barium and calcium.

Malayan Search for Uranium

The possibility that payable deposits of uranium may exist in the F.M.S. is stated in the annual report of the Malayan Geological Survey Department. Miners have been urged to watch for green flakes of torbenite, a uranium-bearing mineral. The report also suggests that some lode deposits might yield tin ore and uranium ore as a by-product.

Antarctic Whaling Expedition

The first of 10 Norwegian whaling expeditions has set sail for the Antarctic. Led by the factory ship *Kosmos IV* it comprises 14 catcher boats and a complement of 550 men. Four British and South African expeditions, two Japanese, one Russian and one Dutch, with further parties from Norway, are expected to join the *Kosmos IV* later.

U.S. Steel Capacity

Ingot capacity of the American steel industry is to be expanded by 9.4 million tons (annually) between July 1 last and the end of 1952. The new total will then be 109,963,000 tons, compared with 82.8 million in 1941, and 94 million at the peak period of 1944. Steel production last week was 1,942,200 tons and a record output of 1,951,900 is expected from this week, according to the American Iron and Steel Institute.

· PERSONAL ·

MR. A. R. McBAIN, a part-time member of the Southern Gas Board, has been appointed a part-time member of the Iron and Steel Corporation of Great Britain, to fill the vacancy created by the decision of Mr. R. A. Maclean that he could not sincerely participate in the scheme to nationalise much of the iron and steel industry. Mr. McBain, who is 63, is appointed for six months. He is a former under-secretary of the Ministry of Supply, in the department of munitions supplies.

New Fellowships for chemical research for 1950-51 have been awarded by the trustees of the Ramsay Memorial Fellowships as follows:—

MR. EDWARD GELLES, a British Fellowship of £500 a year at University College, London; DR. R. W. A. ATTREE, a Canadian Fellowship, at the University of Bristol; MISS M. J. MOLERA, a Spanish Fellowship at Oxford University. Four Fellowships also have been renewed for 1950-51.

SIR HERBERT MERRETT, deputy chairman of Powell Duffryn, Ltd., has agreed to become chairman of the company on the retirement of MR. EDMUND LAWRENCE HANN, who has held that office for more than 22 years. Lt.-Col. C. H. C. GUEST, director, is retiring from office, being over the age limit.

MR. J. C. CHRISTOPHERSON, sales director of Albright & Wilson, Ltd., and MR. K. A. M. BARTON, are among the directors of Midland Silicones, Ltd.

MR. KENNETH G. HOLDEN, chairman of Hardman and Holden, Ltd., Manchester, has been appointed a director of the Royal Bank of Scotland.

The retirement from the board of the General Electric Co., Ltd., of MR. MAURICE SOLOMON because of continued ill-health, brings to an end a fruitful collaboration which has continued since 1903. That was the year in which he joined the General Electric Co., Ltd., after a short period with Johnson Matthey & Co., and the Nernst Lamp Co., to work in the experimental department of the Robertson Lamp Works. Mr. Solomon became a director in 1915 and in 1920 became managing director of Pirelli-General Cable Works, Ltd., which he continued to direct until 1928. His rapid and sustained success was aided by an exceptionally clear mind, which enabled him to make a logical approach to all problems, and his great capacity for lucid exposition.

SIR WILLIAM COATES has retired, at the age of 68, from Imperial Chemical Industries, Ltd., with effect from the end of September. He has been a director of the company for 21 years and a deputy-chairman for five.

SIR JOHN GREEN has been nominated as deputy chairman of the Iron and Steel Corporation of Great Britain. He resigned from the boards of Thos. Firth and John Brown, Ltd., and Firth Brown Tools, Ltd., and from his executive offices on September 30.

For heroic rescue, at the risk of his life, of a colleague (Mr. Charles Clack), following an explosion at the works of the Northern Aluminium Co., Ltd., Banbury, on May 18, MR. JACK BROWN has been awarded the George Medal.

MR. W. B. EASTON has been appointed to the board of James North & Sons, Ltd., manfucturers of PVC protective clothing. He was for many years general manager and latterly a director of Textproof (of Salford), now part of the J. B. Broadley organisation.

MR. W. S. STEEL has been appointed a director of the British Thomson-Houston Co., Ltd., as from October 2. He went to South Africa in 1937 as engineering representative of the BTH organisation, and for two years during the war held various technical appointments under the U.K. Government. He returned to BTH in September, 1943, and in December, 1946, was appointed manager of BTH home sales and in May, 1948, was elected a director of the British Thomson-Houston Export Company.

MR. R. E. G. WINDSOR, 27 year-old managing director of R. H. Windsor, Ltd., London, E.C.2, and South Chessington, Surrey, the makers of plastic injection moulding and extrusion machines, left London airport on September 30 for a six-weeks' business trip of 30,000 miles with his fellow directors, MR. F. T. WRIGHT, and COMMANDER F. C. FELLOWES-GORDON. One of the purposes of the tour is to conduct a plastics fact-finding mission in India and Pakistan, which the director considers have big potentialities for trade. The company has recently established a new sales company in Bombay, R. H. Windsor (India), Ltd. Mr. Windsor will also be visiting Australia, and later, in Tokio, he will address members of the Rubber and Chemical Society in Japan.

HOME

Overseas Letter Rate Increased

The minimum foreign letter rate of postage has been increased from October 1 from 3d. to 4d. This rate applies to virtually all countries except the British Commonwealth, U.S.A., Burma, Egypt, Israel and Jordan.

Tin Prices Rally

After a firm start, with a settlement price of £811 on September 26, tin became easier with a settlement of £780 at the closing session on September 29. The market was stronger on October 2 when tin recovered on the London Metal Exchange, with a settlement price of £804—an increase of £24.

"C.A." Back Issues

THE CHEMICAL AGE has received a request from the Chinese Society of Chemical Industry for a number of past issues of this journal, which are not now available. The co-operation of readers is invited to provide copies of THE CHEMICAL AGE of the following dates: 1948—July 2, September 10, October 22, November 12; 1950—March 4.

New Distillation Plant

The South Eastern Gas Board is to install a new modern tar distillation plant at its Ordnance Wharf Byproducts works. It will be capable of dealing with 200 tons of tar every 24 hours and will produce seven oil fractions simultaneously, together with two qualities of pitch. A contract to build the plant has been placed with Wilton's Patent Furnace Co., Ltd., Horsham, Sx.

Wolfram Supplies and Prices

The price of wolfram (nominal) last week reached a new peace-time record of nearly 250s. a unit. Supplies are short, partly due to involuntary accumulation in Burma due to transport problems. Portugal dominates the market and there have been offers of odd lots from Bolivia. Supplies from South Korea an important source before the fighting, may be resumed, with U.S. assistance.

Zinc Prices Revised

Changes in the prices of zinc (per long ton delivered) as from October 1 were announced by the Ministry of Supoly this week as follows: GOB. Prime Western and debased £151 (£147 10s.); refined and electrolytic £155 (£152); not less than 99.99 per cent purity £157 (£158). Prices of zinc oxides in lots of not less than 2 tons delivered, were raised by £3 from October 2. New prices are: Red seal, £139 10s.; Green seal, £141; White seal, £142.

Costly Rubber Raises Tyre Prices

The price of car, commercial vehicle and agricultural tyres rose on Monday by 17½ per cent, cycle tyres by 12½ per cent, and aircraft tyres by 25 per cent. Retreading prices were correspondingly increased.

£10,000 Glass Plant for Overseas

A single overseas order requiring nearly £10,000 worth of plant has been received by Quickfit and Quartz, Ltd., makers of chemical and laboratory glassware. This was disclosed by Sir Graham Cunningham, chairman of the Triplex Safety Glass Co., Ltd., of which Quickfit and Quartz is a subsidiary, at the Triplex annual general meeting held in London.

Dundee Grant for Jute Research

The British Jute Trade Research Association has made to University College, Dundee a grant for two years to encourage the college to undertake research work on the fundamental structure of jute and allied fibres. The work is designed to clarify certain details of chemical properties of the structure of jute and allied fibres, supplementing the applied research which has been performed by the BJTRA

Technical and Scientific Register

The total enrolled on the Technical and Scientific Register at August 14 was 5642. This, states the September issue of the *Ministry of Labour Gazette*, included 3204 registrants already in work but who desired a change of employment, 858 students provisionally enrolled, and 1580 registrants who were unemployed. During the period July 11 to August 14 (five weeks) 531 vacancies were notified, 331 were filled and 475 cancelled or withdrawn. Vacancies outstanding at the end of the period were 3763.

Laboratory Equipment as Dollar Earner

The important contribution to the growing volume of trade with Canada made by specialised technical products is recalled by a statement this week that Baird and Tatlock (London), Ltd., has been chosen by the Canadian Government to equip the laboratories of the Canadian Research Council in Ottawa, and to provide BTL metal unit furniture throughout. The order represents earnings of approximately Canadian $220,000 and supplements an earlier order for laboratory equipment for the Department of Health, Ottawa, on which work is now proceeding.

The Stock and Chemical Markets

CAUTION has been evident in stock markets this week, although the big increase in the sterling area's gold and dollar reserves helped sentiment, particularly in the gilt-edged section where 3½ per cent War Loan touched the highest level this year. The freeing of the Canadian dollar had the effect of causing a moderate decline in some dollar stocks. Because Canada is an important link between the sterling and dollar areas, the freeing of the Canadian dollar has given rise to renewed talk that the £ sterling might be revalued to the equivalent of 3 dollars. Early this week this rumour caused a setback in Kaffir gold mining shares, (a higher value for sterling would mean a reduction in the price of gold).

Industrial shares were steady, but quiet, partly because of caution and a tendency to observe pronouncements at the Labour Party conference for any clues as to Government policy. Among chemicals, Imperial Chemical were little changed at 42s. 4½d., Laporte Chemicals 5s. ordinary 10s. 6d., Brotherton 10s. shares 20s. and Albright & Wilson were 30s. 6d., with the latter company's new 5 per cent preference at 1s. 6d. premium. Monsanto were firm at 51s., Boake Roberts were 30s. 3d., Amber Chemical 2s. shares 2s. 9d., while F. W. Berk have strengthened to 11s. and Bowman Chemical 4s. shares were 5s. 3d. W. J. Bush were 85s. 6d. and the 5 per cent preference 22s. 9d. British Glues and Chemicals eased to 21s. 3d., although the company has important business in Canada. Turner & Newall again remained active on higher dividend talk, and firmed up to 84s. 9d., while United Molasses were steady at 46s. 6d. and the 4s. units of the Distillers Co. active around 19s. 9d.

Triplex Glass were prominent with a rise to 27s. 1½d. and United Glass Bottle went up to 76s. 10½d. Glaxo Laboratories, on the company's record earnings and 17½ per cent dividend on the capital increased by last year's 900 per cent share bonus, moved up to 51s. Boots Drug have been active around 50s., Borax Consolidated were steady at 55s., Associated Cement firm at 85s. 6d. and Lever & Unilever rose to 42s. 10½d.

The latter company's £10 million debenture issue has been entirely successful, and the City has been talking of a premium of up to £1 over the issue price when dealings start. Many more important issues by leading industrial companies are likely.

Iron and steels showed small irregular movements. There was further selling by holders not wishing to take up the new steel stock, which however, cannot be created before January next at the earliest. Steel shares, however, are bought by some investors as an indirect means of acquiring an interest in gilt-edged. Of other shares, Powell Duffryn at 30s. 6d. were higher on the full results, but Staveley, however, eased to 84s. following the unchanged dividend. Dunlop Rubber were slightly higher at 61s. 9d.

Oil shares were hesitant, but turned firmer later, with Shell at 65s., Anglo-Iranian close on £6⅜ and Trinidad Leaseholds 25s. 6d. Canadian Eagle (registered and no par value) shares were steady at 28s. and 29s. respectively.

Market Reports

A FAIRLY strong tone prevails in most sections of the industrial chemical market. The only important price changes are an increase of £3 a ton in the prices of zinc oxide in lots of not less than 2 tons delivered, and the substantial increases in solvents prices, referred to elsewhere in this issue. The oxide manufacturers' new prices are—red seal £139 10s., green seal £141, white seal £142 per ton. Among the soda products, chlorate, bichromate and yellow prussiate of soda are in good request and almost all offers of the potash products are finding a ready outlet. Bookings for shipment are reported to be on a good scale and the home demand for chemicals used in the textile and plastics industries remains persistent. Pitch is in active request both for home and export account and a good demand continues for creosote oil and crude carbolic acid. The call for ADF cresylic acid is fully sustained at prices approaching 7s. per gal. *ex* works.

MANCHESTER.—The textile trades of Lancashire and the West Riding of Yorkshire are maintaining a steady demand for heavy chemical products and traders on the Manchester market during the past week have reported persistent pressure for supplies from other leading outlets. The alkalis, potash chemicals and the ammonia and magnesia compounds are mostly moving steadily into consumption and a fair amount of replacement buying has been going on. Prices generally continue strong. A fair trade in the compound fertilisers has also been reported. In the

(continued at foot of following page)

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

FISONS, LTD., Ipswich, fertilisers manufacturers. (M., 7/10/50). September 5, £3,500,000 first debenture stock, secured by trust deed dated September 4, 1950; charged on properties and shares specified. *Nil. March 6, 1950.

HOPKIN & WILLIAMS, LTD., London, E.C., manufacturing chemists, etc. (M., 7/10/50). September 6, debenture to Industrial and Commercial Finance Corporation, Ltd., securing all sums to be paid by the company under an undertaking and guarantee; charged on properties and a general charge. *Nil. April 19, 1950.

TIMOTHY WHITES & TAYLORS, LTD., Leeds, chemists. (M., 7/10/50). September 5, security supplemental to trust deed dated July 14, 1947, charged on properties at Exeter, etc. *£1,414,360. July 27, 1950.

Satisfactions

APPLIED METAL FINISHES, LTD., Slough. (M.S., 7/10/50). Satisfaction September 6, of mortgage reg. October 25, 1946.

BAIRD & TATLOCK (LONDON), LTD., laboratory furnishers, etc. (M.S., 7/10/50). Satisfaction August 31, of series of debentures reg. May 24, 1932 and October 24, 1934.

W. J. BUSH & CO., LTD., London, E., manufacturing chemists, etc. (M.S., 7/10/50). Satisfactions September 6, of charges reg. August 5 and October 17, 1910, March 12 and 19, 1919.

Company News

Inspectors Appointed

The Board of Trade has appointed as inspectors to investigate the affairs of P. B. Cow & Co., LTD., Sir Alan Rae Smith, C.A., and Mr. K. D. Cole, solicitor.

Geo. Cohen, Sons & Co., Ltd.

Net profit of George Cohen, Sons & Co., Ltd., for the year ended March 31 is announced as £129,000. A final ordinary dividend of 12 per cent has been declared, making a total of 20 per cent for the year.

Greeff-Chemicals Holdings, Ltd.

An interim dividend of 4 per cent on account of the year ending December 31 compared with 3¾ per cent for the previous year, has been declared by Greeff-Chemicals Holdings, Ltd. This dividend is payable on November 1, to shareholders on the register on September 26.

Imperial Chemical Industries, Ltd.

An interim dividend of 3 per cent for the year ending December 31, on the ordinary stock of Imperial Chemical Industries, Ltd., has been declared. This will be payable on December 1 to shareholders on the register on October 12.

Powell Duffryn, Ltd.

The report of the directors of Powell Duffryn, Ltd., for the year to March 31 last shows that a balance of £993,067 will be carried forward (£955,404 last year) and, in respect of the subsidiary companies, £1,229,647 (£1,175,518). A final ordinary dividend of 5 per cent, making 8 per cent for the year, is recommended.

Thos. W. Ward, Ltd.

The directors of Thos. W. Ward, Ltd., on October 27 will recommend a final dividend of 10 per cent, less tax, on the ordinary share capital, making 15 per cent, less tax, for the year ended June 30, 1950.

Increase of Capital

The capital of Beecham Research Laboratories, Ltd., has been increased from £100,000 to £200,000.

THE STOCK AND CHEMICAL MARKETS

(continued from previous page)

market for the tar products the benzols and xylols are in good demand and a steady trade continues on the American cresylic acid account.

GLASGOW.—Business in general in the Scottish chemical market is fairly steady. Export business has been a little more active recently, but many of the products which were being exported two to three months ago are no longer available for shipment.

Next Week's Events

MONDAY, OCTOBER 9

Incorporated Plant Engineers

Maidstone: The Old Palace, 7 p.m. Kent Branch. Ingersoll Rand Co.: "The Use of Compressed Air in Industry."

Dundee: Mathers Hotel, 7.30 p.m. H. W. L. Tuckey: "Industrial Heating and Choosing the System."

The Chemical Society

Portsmouth: Municipal College, 7 p.m. (with RIC). Prof. H. J. Emeleus: "The New Elements."

TUESDAY, OCTOBER 10

Incorporated Plant Engineers

Manchester: Engineers' Club, Albert Square, 7.15 p.m. East Lancs. Branch. Film: "Ultra High Speed Photography," by Kodak, Ltd.

Society of Instrument Technology

Manchester: College of Technology, 7.30 p.m. A. J. Philpot: "The British Scientific Instrument Manufacturers Research Association."

Institution of Works Managers

Liverpool: Adelphi Hotel, 6.30 p.m. C. P. Gourley, H.M. Superintending Inspector of Factories: "The Factories Act, 1948."

Institution of Chemical Engineers

London: Institution of Civil Engineers, Great George Street, S.W.1, 5.30 p.m. J. Arthur Reavell, chairman of the drafting committee, will open a discussion on: "The Provisional British Standard Code 1500:1949 for Fusion-welded Pressure Vessels for Use in the Chemical and Allied Industries."

WEDNESDAY, OCTOBER 11

Society of Chemical Industry

London: Medical Society of London, 11 Chandos Street, Cavendish Square, W.1, 3 p.m. Microbiological Panel. symposium on: "Air Disinfection and Sterilisation." Programme: C. E. Coulthard—Introduction; Dr. O. M. Lidwell: "Methods of Sampling Air for Micro-organisms"; Dr. R. E. O. Williams: "Methods of Disinfecting Air by Chemical Agents or Ultra-violet Light"; Dr. A. Parker and G. B. Cherry: "The Removal of bacteria from Air by Filtration and its Application to Industrial Fermentations"; F. E. S. Wright: "Large Scale Filtration and Ultra Violet Irradiation for Purification of Air Supplies"; Dr. R. B. Bourdillon to open the discussion.

Royal Institute of Chemistry

Slough: Afternoon visit to Pest Infestation Laboratory. Grammar School, 6.30 p.m. W. Burns Brown: "Factors Affecting the Distribution of Fumigants."

Salford: Royal Technical College, 6 p.m. Student members' annual general meeting, and display of electronic instruments. J. T. Marsh: "The Work of the Institute."

Manchester Metallurgical Society

Manchester: Engineers' Club, Albert Square, 6.30 p.m. E. J. Heeley (presidential address): "A Metallurgist in the Chemical Industry."

Association of British Chemical Manufacturers

London: Grosvenor House, Park Lane, W.1, 7 p.m. Annual dinner.

THURSDAY, OCTOBER 12

Royal Institute of Chemistry

Acton: Technical College, High Street, W.3, 7 p.m. J. E. Johnston: "Radioactive Isotopes, their Production in Atomic Piles and Some Industrial Uses."

The Chemical Society

London: Burlington House, Piccadilly, W.1, 7.30 p.m. J. Shorter and C. N. Hinshelwood: "The Kinetics of the Oxidation of Organic Compounds—Parts I and II"; P. Davis, M. G. Evans and W. C. E. Higginson: "Some Oxidation-reduction Reactions of Hydroxylamine"; C. E. H. Bawn and A. G. White: "Reactions of the Cobaltic Ion. Parts I, II, and III."

Oil & Colour Chemists' Association

Cheetham: Town Hall, 6.30 p.m. Third post-graduate lecture. Dr. A. S. C. Lawrence: "Topics in Colloid Chemistry."

Society of Dyers and Colourists

Manchester: Gas Showrooms. Town Hall extension, 6.30 p.m. Dr. W. W. Barkas: "The Swelling of Fibres."

Society of Glass Technology

St. Helens: Gas Showrooms, Radiant House, 6 p.m. Prof. W. E. S. Turner: "The Chemical Durability of Glass."

FRIDAY, OCTOBER 13

The Chemical Society

Bangor: University College of North Wales, 5.45 p.m. Professor T. S. Wheeler: "Studies in the Synthesis of Flavones."

Exeter: Washington Singer Laboratories, Prince of Wales Road, 5 p.m. Dr. W. J. Dorling: "Research in the Paint Industry."

Swansea: University College, 5.30 p.m. (with RIC). Prof. F. Challenger: "Some Aspects of the Chemistry of Sulphur Compounds Occurring in Nature."

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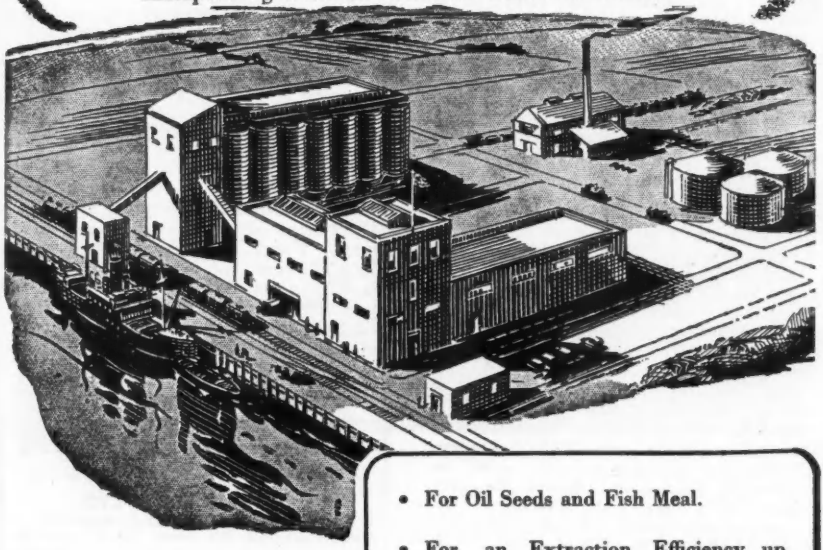

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28/4

Patent Processes in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patents Office, Southampton Buildings, London, W.C.2, at 2s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Lower alkyl esters of N-acylamino aliphatic carboxylic acids.—Merck & Co., Inc. June 12 1947. 644,915.

Process for preparing chloral alcoholate or chloral.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. June 27 1947. 644,916.

Burner adapted to burn either liquid or gaseous fuel.—Combustion Research & Development, Inc. July 3 1947. 644,785.

Production of photographs in blue-black tones.—General Aniline & Film Corporation. July 8 1947. 644,788.

Extraction of dangerous gases from mines.—M. Parry. July 15 1948. 644,869.

Solvent extraction of glycerides and of fatty acids derived therefrom.—Pittsburgh Plate Glass Co. July 21 1947. 644,917.

Manufacture of protein hydrolysates.—Raptakos, Brett, & Co., Ltd., and G. B. Ramasarma. July 25 1947. 644,918.

Method of producing bio-synthetic antimicrobial substances.—Upjohn Co. July 29 1947. 644,919.

Production of polyolefinic hydrocarbons.—Universal Oil Products, Co. Aug. 6 1947. 644,873.

Sulphonamido pyrimidines.—Sharp & Dohme, Inc. Aug. 7 1947. 644,702.

Method of obtaining hydantoins.—Parke, Davis & Co. Aug. 7 1947. 644,800.

Production of dicarboxylic acids or anhydrides thereof.—California Research Corporation. Aug. 7 1947. 644,920.

Styrene co-polymers.—Pinchin, Johnson & Co., Ltd., L. W. Coveney, S. L. M. Saunders, and D. Schiller. Sept. 8 1948. 644,877.

Adhesive tape having a cleanable backing.—E. I. Du Pont De Nemours & Co., Aug. 14 1947. 644,803.

Manufacture of cellular material from clays or similar silicates.—A. Frokjaer-Jensen. Aug. 20 1947. 644,636.

Process and apparatus for coating surfaces with plastic and other semi-liquid composition.—A. H. Hawes. Aug. 28 1948. 644,638.

Manufacture of metalliferous azo-dyestuffs.—Ciba, Ltd. Sept. 29 1947. 644,883.

Production of sulphuric acid.—Imperial Chemical Industries, Ltd., and H. A. Edge. Oct. 1 1948. 644,924.

Production of terephthalic acid.—Gas Light & Coke Co., R. H. Griffith, J. H. G. Plant, and J. O. H. Newman. Sept. 30 1948. 644,707.

Anodic treatment of aluminium and aluminium alloys.—Soc. Anon. Pour la Protection et la Coloration des Metaux, Trefileries et Laminoirs du Havre, and J. F. G. Herenguel. Oct. 27 1947. 644,887.

Process of preparing 7-dehydrosterol esters from 7-halogensterol esters.—Naamlooze Vennootschap Philips' Gloeilampenfabrieken. Nov. 21 1947. 644,891.

Manufacture of artificial resins.—Spolek Pro Chemickou a Hutni Vyrobu, Narodni Podnik. Dec. 29 1947. 644,894.

Manufacture of insecticidal solutions.—J. R. Geigy Akt.-Ges. Dec. 29 1947. 644,895.

Production of pseudo-alloys. — D. Primavesi. Dec. 29 1947. 644,813.

Protection of gelatine and other colloid layers.—Kodak, Ltd. Dec. 31 1947. 644,814.

Manufacture of disazo dyestuffs.—Imperial Chemical Industries Ltd., and F. P. Reed. Jan. 31 1949. 644,897.

Treatment of rubber.—Dunlop Rubber Co., Ltd., W. C. Davey, F. A. Jones and P. L. Bradshaw. Jan. 4 1949. 644,931.

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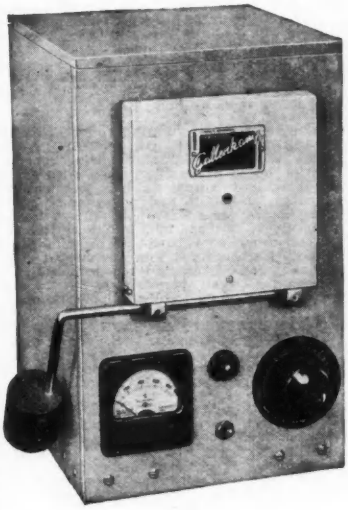

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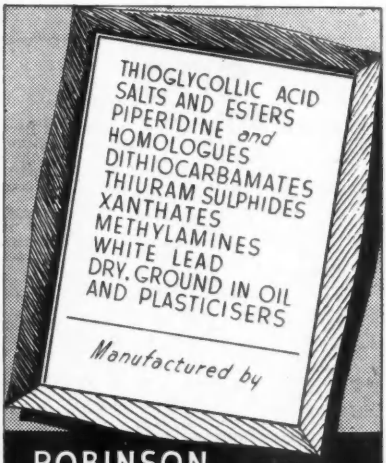

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Lack of space prevents our going into the subject very deeply. The chief thing to remember is that the RCF Value of a centrifuge increases in *direct proportion* to an increase in head diameter, but increases *with the square* of a gain in speed. It is this latter fact that makes the high speeds obtainable with all MSE Centrifuge Models so useful. MSE's high speeds, meaning greatly increased RCF Values, lead directly to shorter centrifuging times and more work done per machine, apart from the possibility of separating suspensions with a specific gravity that might have defied lower centrifugal forces.

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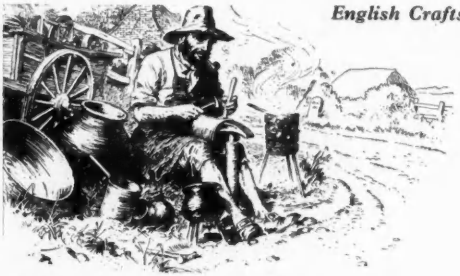

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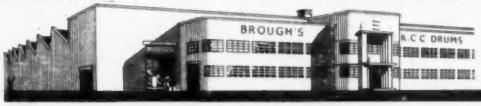

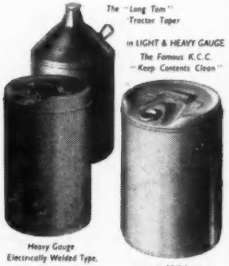
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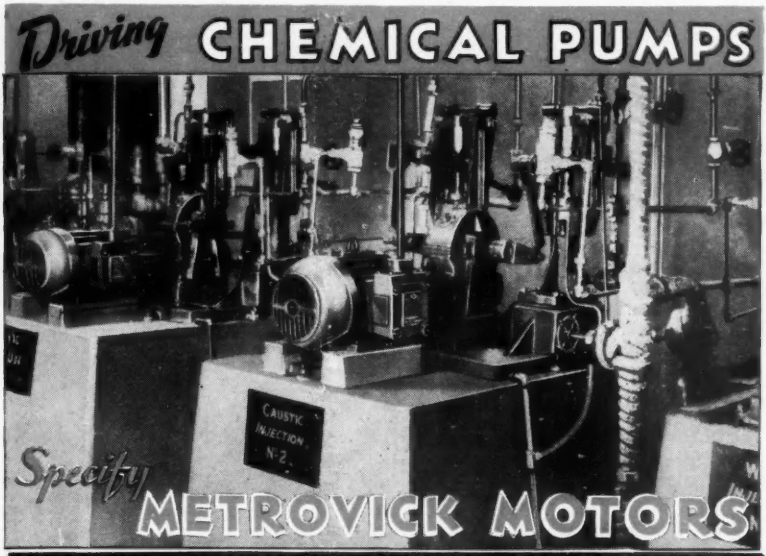

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